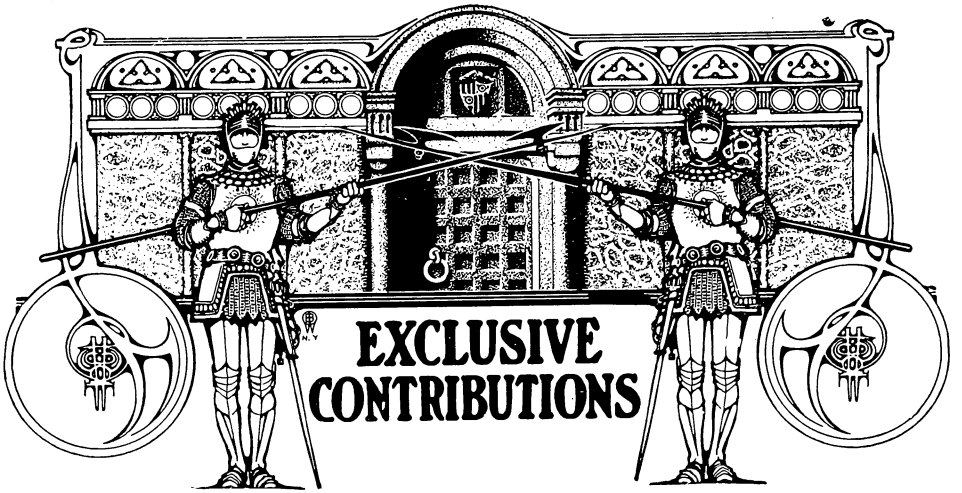


The Gold Inlay.*

By Dr. J. V. Conzett.

The ideal place for the gold inlay is in those teeth that are so badly broken down that foil filling is confessedly impossible, and the crown has been the only alternative. These teeth in the past have been built up with amalgam by some operators, and have given good service for many years, but too frequently gold shell crowns have been placed upon teeth that could have been saved with a filling. I have frequently been called upon to remove a shell crown that has been illy fitted, and in consequence thereof decay has occurred under the crown, necessitating the removal of the same. And many times I have found that the crowning of that particular tooth was little short of malpractice. Last week a crown was removed from a lower molar that had a recurrence of decay at the gingival margin, undermining the crown and so encroaching upon the pulp (which had not been destroyed) that a pulpitis had ensued, and the difficulty had been discovered through the pain that had resulted. After the crown had been removed, it was found that there was enough of the original tooth still remaining to save it with an inlay, and this after it had been crowned and had subsequently decayed. This is only one of the many cases that have come under my observation. The reason why such methods have been followed has been because of the inability of the operator to make a presentable gold filling in that particular situation, and, rather than con-

fess his lack of skill or suggest an amalgam filling in a tooth near to others that had been restored with gold, he chose the, to him, lesser evil and made a gold crown. To-day such a thing would be wholly inexcusable, if it ever was, because the gold inlay will not only take care of badly decayed teeth and cavities in such inaccessible places that the inexperienced operator finds them very difficult to fill, but it also splendidly saves those teeth that would have been crowned even by the best of gold operators. It is becoming a rare thing to find it necessary to make a gold shell crown, for no matter how badly a tooth may be broken, a well adapted

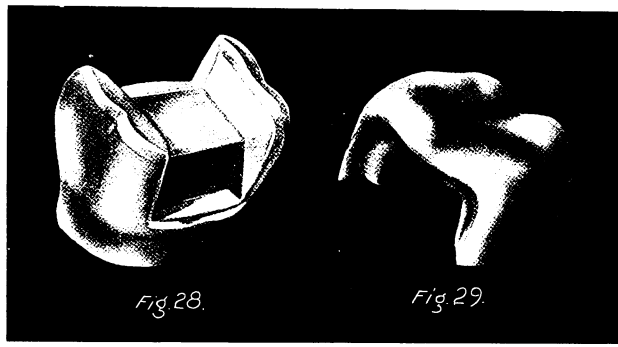


Fig. 28. Fig. 29.

inlay will, in most cases, give better service than a crown, and the crown is rapidly becoming relegated to its proper province of an abutment to the bridge, and before many days will not be found in any other place in a well-conducted practice.

Restoration of Complete Occlusal Surfaces.

Let us imagine a molar presenting with cavities in the mesial, distal and buccal surfaces, with the tooth so badly decayed that the pulp is involved, and its destruction found necessary. After the extirpation of the pulp and the filling of the pulp canals it is decided to restore the tooth with an inlay. The enamel walls, both buccally and lingually, are so badly undermined that it is necessary to thoroughly protect them or they will break down under the stress of mastication after the tooth has been filled; therefore, the cusps are ground off with a carborundum stone until firm tooth structure is reached. The cavities in the buccal pit, the distal and mesial surfaces, and if there is a dipping down on the lingual surface, as there frequently is, are all cut out. The seats of all of these cavities will be made flat with an inverted cone burr, followed by a planing with chisel or hoe. The axial walls distally and mesially should be somewhat inclined, and as these walls will have been broken down by the decay, in all probability it will be necessary

to restore them with cement before the cavity preparation is commenced. This is done at the same sitting when the pulp canal is filled, and the patient is then dismissed, if possible, until a future visit, to enable the cement to attain its maximum density. The cavity is now prepared as though the cement were dentine. The axial walls, both in the buccal and lingual cavities, should not be parallel but slightly convergent, as in the illustration (Fig. 28). The enamel margins are to be protected as in the case of an ordinary inlay. All gingival margins should be given the bevel usually indicated in such positions, and as illustrated in Fig. 28. The enamel margins along the axial walls are to receive the same treatment as are the margins on the buccal and lingual surfaces. The margins of the enamel on the occlusal surface, however, that have been ground down to insure strength of tissue, should be generously beveled with a stone all around the occlusal surface, so that the inlay, when it is finished, may have a generous flange of gold that will effectually lock the walls to place, and prevent any breaking of either wall after the inlay is set.

This treatment is far preferable to a crown for many reasons. In the first place, there is no overhanging margin to be a constant source of irritation to the gum tissue, no matter how perfectly it may be adapted, and there are very few crowns that are perfectly adapted to the tooth. In the second place, there is far less liability of decay under such an inlay than there is under the average gold crown, and there is a better opportunity of obtaining a perfect occlusion.

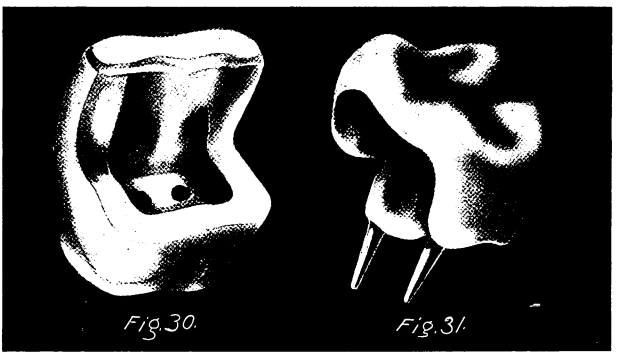
Of course, the occlusal surface of such an inlay must be carved to reproduce the anatomical markings of the tooth that is reproduced, and the artistic and technical skill of the operator may be displayed to splendid advantage. Fig. 29 is an illustration of the inlay crown made for the case illustrated in Fig. 28. A study of the inlay will make more clear any point of the procedure that may not be perfectly understood. It will be noticed that a large body of gold has not been allowed to enter into the making of this inlay, and this is done for a reason. Not that of economy altogether, though that is never to be despised, but for the reason that the larger the mass of gold in a casting the greater will be the total distortion due to shrinking. Therefore, the cement is allowed to fill the tooth well up toward the occlusal surface, and then the cavity cut into that with the idea of making the mass of gold required to perfectly reproduce conditions, as small as possible. The mesial and distal axial walls are inclined for the same reason, *i.e.,* to allow for a slight distortion of the gold at these positions, which will be corrected to some extent as the gold is malleted over these inclined planes, thereby spreading the gold, and at the same time causing them to more firmly hug the walls of the cavity in these positions.

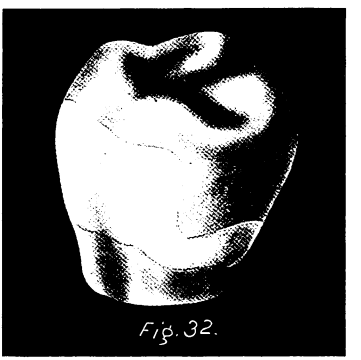
Molars With But One Wall Standing.

We will frequently have presented for treatment a molar that has had either the whole lingual or buccal wall broken off, and often the break will be so extensive that its margin will be far under the gum. These cases are always difficult, but can be beautifully restored with an inlay crown. Let us first take a tooth that has lost the lingual wall in such a way that only the buccal wall is left, and the margin of the break on the lingual surface extends under the gum margin. Unless the break is of very recent occurrence, the gum tissue will have grown into the break, and will have to be crowded out. This can be accomplished by packing gutta percha into the cavity in such a way that the gum is forced out of the cavity, and the gutta percha should be left for several days that the gum may be well absorbed, so that it will not immediately fall into the cavity when the plug is removed. In this manner a good view of the field of operation may be secured. Of course, the root canals must be perfectly filled before any attempt is made to restore the lost portion of the crown. Usually the pulp has been removed before the accident has occurred, and the root filled. It is probably an old case, in which the root fillings have been in the tooth for years. Whether so or not, it is always better to be sure and sterilize the canals before any attempt is made to enter them. For if there is any infectious matter present, the danger of forcing some of it through the apical foramen, and thus causing an alveolar abscess, is great. The best means of sterilizing these roots is to seal a portion of Buckley's solution of tricresol and formalin into the pulp chamber with cement. When this has been in place for a day there is practically no danger of trouble from the organisms that may have been in the tooth prior to the treatment, and if aseptic precautions are now observed, there will be no trouble with infection. The canals having been filled, and the gum tissue crowded out of the cavity, we are prepared to go on with the preparation of the cavity for the reception of the inlay crown.

The mesial and buccal surfaces have been broken down and undoubtedly filled at a previous time, but the fillings are now missing. The gingival seats, both mesially and buccally, are made flat and the buccal axial walls—mesial and distal—are straightened up. The interior of the cavity presents with only one wall, and that the buccal. This is smoothed and all under-cuts are removed, either by cutting out, or, if that is not advisable, by the filling in with cement. The canals are reamed out to as great a depth and diameter as is deemed advisable, care being taken that the canals reamed out will be parallel. Into these canals are fitted pieces of iridio-platinum wire of as large gauge as the canals will

permit. In our practice the 14-gauge wire is used and is tapered to a point with a file, which makes it of a size to fit the canal that has been reamed out. One of two methods may be used. With the pins in place a good modeling compound impression is obtained, and the resulting impression run up with a casting investing material, composed of one part





of plaster and two parts of silex, this by measure. This investing material is harder than the usual material used, and will allow of the separating of the cast from the modeling compound if care is taken and dry heat used. Then inlay wax is built in the cast, and the whole invested upon a sprue in a casting flask, when the ordinary method of casting is followed out, and the result will be an inlay with pins that fit into the canals in the root, and the whole of the tooth restored to usefulness in a manner that is at once a satisfaction to the patient and a source of pride to the operator.

The other method mentioned is to place the pins, and then with an inlay wax that has been thoroughly warmed, make a model of the desired inlay directly in the cavity as for any ordinary inlay. If it is possible to

place a matrix in using this method, it is far better to do so. Such a matrix may be best made by taking a very thin piece of annealed copper and fitting it around the tooth as if you were making a band for a gold crown. Then into this matrix is forced the inlay wax. The pins should be thoroughly dried before the wax is forced into the cavity that the wax may better adhere to the pins. In removing the model the entire matrix is to be removed with the wax pattern, and then with a sharp knife split and taken away from the pattern which may now be smoothed up and invested in the usual manner. If desired the matrix may be made from pure gold and the inlay cast directly into it, and the surplus gold of the matrix cut away after the casting is completed. Sometimes the platinum pins do not firmly adhere to the wax, in which case they are to be placed into position in the pattern, and with a hot instrument the wax melted about them. Then the whole pattern is again tried into the cavity to insure correctness of apposition. In this manner of making the wax pattern, which is the one commonly used by the writer, the wax may be judiciously hollowed out by the exercise of care not to disturb the alignment of the pins. This is always advisable when possible, that too great a body of gold may not be introduced into the inlay. Fig. 30 shows the cavity as it is prepared for the reception of the inlay. In addition to the description of the text, it will be noticed that the gold is allowed to run over the bucco-occlusal surface for its protection, and in the tooth it will be observed that this wall has been cut down to allow the gold to cover it, and the cavo-surface is made with a wide bevel. Fig. 31 is an illustration of the finished inlay crown, and Fig. 32 is an illustration of the tooth with the inlay crown cemented to place. This will show how much better for tooth and patient is such a restoration than a gold shell crown.

It is, of course, necessary to have the contact points as perfect as it is possible to make them, and the entire inlay crown should perfectly restore the tissue that is lost, not only as to the space occupied, but also the anatomical markings of the tooth. The cusps and sulci should be restored as perfectly as the art of the operator will permit. To ensure a perfect casting of the gold upon the platinum pins, it is well to melt a little 18 karat solder upon the parts that are to be covered with the gold of the inlay. This will insure a perfect adaptation of pin and gold, for the melted gold, of so much higher melting point than the solder, will cause it to melt, and a perfect union will take place between them. This is a good practice to employ whenever a perfect union of cast gold is desired with any gold or platinum that is cast upon.

Another Method for Similar Cases.

This same method may be used when the buccal wall has been broken away as well as for the lingual. Another method that is employed occasionally in my

practice, in selected cases, is the following: When a case presents with one or the other of the lateral walls broken away, and the break does not extend below the gingival margin, thereby giving an intact pulp chamber, the gingival seat all around the broken portion is made as flat as possible, and the axial walls prepared as in the former case. The pulp chamber is now opened up, and the walls thereof made straight and as square as the case will permit. As much as possible the floor of the pulp chamber is made flat, but care must always be taken when cutting into the floor of

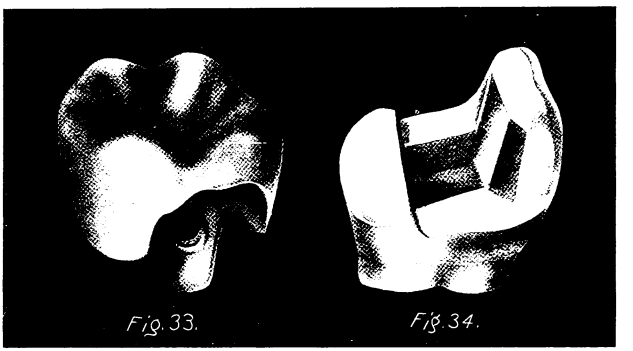


Fig. 33. Fig. 34.

the pulp chamber that a puncture does not occur; therefore, as little cutting as possible should be attempted. If the chamber is at all deep, this will give a splendid anchorage for a crown inlay. A matrix of annealed copper is now fitted to the tooth, making a band all around it, and the inlay wax forced into matrix and cavity, this to be thoroughly chilled and wax and matrix removed at the same time. Now the model may be poured without the removal of matrix, and when the investing material is sufficiently hard, the matrix is slit and removed, the model trimmed, as it is desired to have the finished product, and then flasked and poured.

In many of these cases it is possible to hollow out the crown inlay to quite an extent with the Roach suction wax carver, which is a decided advantage for the sake of economy, as well as for the purpose of reducing the quantity of gold so as to more perfectly control the shrinkage in the mass. I have had crowns that I have made by this method placed upon roots of young persons that had presented with the teeth decayed so far below the gingivæ that an ordinary shell crown was an impossibility, but with this method better, and I believe more lasting, restorations were made, and no trouble has ever been experienced with them. When one realizes that with such a method at his disposal the irritation attendant upon the shell crown is never seen at the gingival border, he thanks God that Taggart was given the genius of invention.

In Fig. 33 is shown the preparation for a restoration of this kind, and Fig. 34 illustrates the finished crown inlay.

Facial Expression from the Point of View of the Artist.

By Henry Read, Denver, Col.

Read before the American Society of Orthodontists, Denver, July 15, 1910.

It may seem something of an impertinence for me, a layman, to address a convention of specialists, especially when I have to confess but a recent acquaintance with their aims and practice. However, a certain bond of sympathy between the artist and the orthodontist may be accepted as an excuse for my appearance before you to-day.

In attempting to bring such artistic experience and knowledge as I possess into practical relation with your work, I am met at the outset by the difficulty that no systematic record of observations in the direction I shall indicate appears to be available for the purpose of research, nor does modern medical science seem to have given much attention to an aspect of the subject which to me offers curious and interesting problems. I shall, therefore, ask you to regard what I have to say as merely suggestive, though worthy it may be, of further examination.

Since the practice of orthodontia affects the form of the face, and the form of the face is generally accepted as a visible expression of character, we are justified in saying that no practitioner should neglect consideration of appearance. To what extent he should be influenced by it admits of no direct answer, but a discussion of this matter cannot fail to be profitable.

In attempting to study form in its relation to beauty in the human figure, the personal equation plays so prominent a part that we shall find the investigation beset with difficulties of an unusual nature. Form is

apt to be so closely associated with other constituents of beauty, and the effect upon the observer to be so greatly modified by his own idiosyncrasy, that we must be on our guard against errors arising from such a source. Nevertheless, if we compare the male with the female figure, the Caucasian with the Mongolian or the African race, Greek sculpture with contemporary life,—if we recognize the innumerable differences, both of type and of individual among all races, we shall find it hard to believe that any abstract standard of beauty can be formulated.

Must we then say that appreciation of human beauty is purely a matter of personal preference, and slightly paraphrasing a remark that all of us have heard, say, "I know nothing about beauty, but I know what I like?" Surely there is another alternative. In the first place, let us assume that a normal exists for a racial or typical group (I shall presently explain what I mean by "typical group"), and that the average or composite is the best substitute we can find for the normal; let us further assume that familiarity (both personal and inherited) with the average creates an unconscious standard in the mind to which all variations are referred, and we have a working hypothesis that fairly accounts for observed facts, and will, I think, assist us in the practical inquiry we have in hand. It does not, of course, explain the origin of form, which must be traced through the stages of evolution, and, in this connection, we face the question whether normal form, or a standard of beauty, is not the outcome of complete and perfect adaptation of the means to the end,—whether function is not the key to the situation? If this be so, the orthodontist, building his practice upon perfect occlusion of the teeth, may surely argue that normal form will follow, without extraneous assistance from facial expression, which term is here used to denote, not changes caused by more or less transient emotion, but permanent modifications of form caused by organic growth. A little reflection, however, will warn us against the danger of placing too much reliance upon a theoretical statement, which cannot be realized under practical conditions. Neither human knowledge nor human skill can lay claim to finality. It cannot be said that science has marked out the limits of function. At some future time it may possibly be shown that specific organs have functions undreamed of to-day, and discoveries may be made of interaction and inter-relation to which at present we possess no clue. Furthermore, we cannot suppose that the mental and physical powers of any practitioner are of so high an order that he can afford to dispense with such additional aid as he may be able to secure through other channels.

It seems to me these are reasons that should appeal to orthodontists for a study of facial expression from the point of view of the artist. It will supplement scientific study, and, perchance, throw many a sidelight

upon otherwise obscure points. The eye sees what it looks for, and observation from another position will at least add something to the fullness of conception.

Reverting now to the expression "typical group," I wish to call your attention to another phase of the subject. Artists and sculptors, consciously or unconsciously, have been guided by a harmony of relation of the features to the head, of the head to the figure, and of the figure to a group marked by physical similarities among its members. The latter can best be illustrated by a reference to Greek sculpture. One need only recall the representations of Apollo, Hercules, Diana, Venus and Minerva, to realize that comparatively simple types have been embodied in these statues. That such variations were based on real and observed differences cannot be doubted, although classification resulting from scientific research has contributed little or nothing to exact knowledge. From those days down to the present, such terms as sanguine, lymphatic, phlegmatic, choleric, melancholic, athletic, bilious, and nervous, have been variously used to designate what have been called temperaments, and other attempts have been made to classify with reference to the locomotive, nutritive and thinking systems. It is true that manners and customs of the present day deprive us of the opportunities that were afforded in classic times to become acquainted with the human figure, but if the face is a link in the chain of bodily form, we must study it in that connection. To isolate it would expose us to the danger of forming conclusions from insufficient data. Yet it is within the experience of most of us that the face often seems to fall into some undefined grouping in the mind of the observer, and its peculiarities in the same way are recognized as departures from that standard. Provided such departures are within the limits permitted by the type, the standard of beauty has not been violated. From this it follows that facial expression cannot safely guide the orthodontist, if it be referred to an abstract and unvarying standard.

It sometimes happens that the restoration of a face to its normal form does not meet with unreserved acceptance by intimate friends and relations. If it is really restoration, so far as it can be attained by the employment of knowledge and skill, this is not a serious trouble. We are so constituted that familiarity with what is abnormal soon becomes acquiescence, and change is resented.

I will here quote passages from a letter of Lafcadio Hearn, written in Japan, which also serve to remind us of racial differences, although they deal with questions of color and not of form. He says:

"But to appreciate the beauty of colored skins, it is not simply enough to travel,—one must become familiar with the sight of them

through months and years (so strong our prejudices are!)" And again, "Either Stanley, or Livingstone, perhaps, told the world that after long living in Africa, the sight of white faces produced something like fear. (And the evil spirits of Africa are white.) Well, even after a few months alone with black faces, I have felt that feeling of uncomfortableness at the sight of white faces. Something ghostly, terrible, seemed to have come into those faces that I had never imagined before. I felt for a moment the *black man's terror of the white,*—at least I think I partly realized what it is."

Another matter presents itself. Because the practice of orthodontia is most effective during the period of childhood and youth, the foregoing considerations are important, in so far as they may influence the practitioner by the suggestion of an ideal not created by a knowledge of organic function. During the formative period of life, facial proportion and expression give little indication of adult development, and any study that will aid in forecasting it must of necessity possess a real value.

In order to convey a clear impression of the views embodied in this brief address, I will recapitulate the main statements it contains:

(a) There is no absolute standard of human beauty.
(b) A relative standard can be found in the average or composite.
(c) Such average or composite must be confined to a group.
(d) Race, sex, and so-called temperament, indicate the meaning of a group.
(e) The character of the face bears a distinct relation to the character of the body.
(f) Function may be the ultimate test of beauty, but there are practical obstacles to any effective application of the test.

In closing, I wish merely to add that I am conscious of a superficial treatment of the subject, but hope nevertheless that it will serve the purpose intended, of arousing your interest and attention.

Tooth Powders—Their Ingredients and Effect on Bacteria.

By Daniel S. Neuman, M.D., Denver, Col.
Attending Surgeon in Otology, Rhinology, and Laryngology, St. Anthony's Hospital; Attending Laryngologist to the Jewish Consumptive Sanitarium.

Read before the American Society of Orthodontists, Denver, July, 1910.

Plato in his description of Atlantis makes possibly the earliest written record of the use of dentifrice.

In his famous description of the lost continent, he mentions several times (in describing the ladies of that period), some who possessed what

were supposed to be magical and secret formulas which, if used every day, would render the teeth white and beautiful.

The knowledge of the Egyptian embalmer, how to clean and render the teeth white, is a matter of history.

In the British Museum, on a stone tablet taken from the ruins of Babylon, can be plainly seen and interpreted the evidence that some process was used in rendering the teeth white.

One who has read the "Arabian Nights" can easily conceive the importance which was attached by the Orientals to the use of cosmetics for the purpose of beautifying the face and teeth.

The Turkish harems were possibly the first to establish, so to speak, a specialist, whose sole duty was cleaning the teeth and seeking to discover new remedies for whitening and beautifying them. The prehistoric and primitive man was not in need of any dentifrice, as his mode of living, mainly on uncooked animal food, supplied a sufficient amount of oxygen without any assistance.

The poets of all nations and ages, in speaking of beautiful women, invariably mentioned their white teeth as one of their chief charms.

I could quote for hours from the history of the past, both civilized and uncivilized, to prove still more clearly that the care of the teeth and use of dentifrices was merely for the purpose of beautifying, nor can I find a single instance where in past time the people realized that cleanliness of the teeth was essential to health.

To-day we know that dentrifice has a more important function than that of merely beautifying.

It is only of late years that the importance of keeping the mouth free from remnants of food and masses of tartar commences to be recognized.

The putrefaction of the particles of food which accumulate between the teeth very often becomes a center of diseases and infection; deposits precipitated by the fluids of the mouth sometimes accumulate in large quantities and incrust the teeth.

We know that the formation of pus is very common, and due to the suppuration of the gums. The Fra, in his famous sentence, "The man with the healthy mouth is never sick; the sick man never has a healthy mouth," covers fully the true situation from the result of decay, fermentation and bacteria in the mouth.

During the last few years it has been proven conclusively that decay of the teeth is mostly due to fermentation bacteria and fungi: to stop fermentation it is necessary to use a remedy entirely different from that which will render the life of the bacteria short.

The good tooth powder is one which contains in combination ingredients which will perform this double function.

It is my intention to-day to review for you the tooth powders of the past, with their ingredients, and compare them with those of the present day, for which we are indebted to the knowledge of chemistry, bacteriology and the modern dentistry.

Ingredients Commonly Used In Tooth Powders.

The customary ingredients are chalk, pumice stone, orris root, soap, myrrh and cuttle fish bone.

We will first consider the chalk; it is possibly the only rational remedy in the older tooth powders prescribed; the others of them form an insoluble mass which often enters between the free margins of the gums and forms a foreign body which will eventually produce inflammation of the surrounding tissues.

Of late we notice a good deal of criticism of the tooth powders containing salol, as at a certain temperature and coming in contact with the acids and ferments of the mouth, it often liberates free carbolic acid.

The pumice stone is only safe in the hands of a dentist, and not for repeated daily use.

The oxygen tooth powders, which have apparently come to stay, do not all possess merit, as some of them are incompatible, and some contain oxide of lime.

The good oxygen combination, to my mind, is one which contains the following ingredients: borated sodium peroxide, magnesium peroxide, aluminum hydroxide and calcium carbonate.

With your permission I will endeavor to analyze each of these substances separately.

Borated sodium peroxide, as we all know, is practically powdered peroxide of hydrogen, and being alkaline in reaction, contains a small amount of peri-borax, which also acts as an antiseptic.

It is a sodium salt of perboric acid; it contains nine per cent. of oxygen. It occurs as a white granular salt soluble in water. It is decomposed by water into hydrogen peroxide, producing an alkaline solution; heated to sixty degrees C. it develops oxygen and ozone. It is antiseptic, deodorant and bactericidal.

Magnesium peroxide (which secretes oxygen more slowly than the borated sodium peroxide) is a strong antacid; it contains sixteen per cent. of oxygen; it has activity to decompose ferments and animal tissue; it has a bleaching and disinfecting effect and is generally used in place of the hydrogen peroxide.

Aluminum hydroxide has all the beneficial effects of chloride of potassium, being a secondary oxydizer without any of the corrosive or

toxic action of the potassium. It is a colorless, white powder, odorless and having a cooling, saline taste and is soluble in water. Like the potassium permanganate, it has been employed in various diseases of the nose and throat in ulceration, syphilitic mucous patches and herpes of buccal cavity.

Calcium carbonate is an antacid and forms a heavy body for the mixture.

The many species of microbes and most of vegetable organisms are the cause of a large class of infection and contagious diseases.

The process of fermentation is in itself the growth and multiplication of these micro-organisms.

The effect of oxygen on bacteria can be easily demonstrated in a bacteriological laboratory, and, as we have to deal in the mouth mostly with non-oxygen living bacteria, this makes it more desirable.

The bleaching power of oxygen has been known for ages, the slight astringent effect of aluminum hydrate is very beneficial to the abrasions of the soft tissues which surround the teeth.

The combination above mentioned makes a very desirable tooth powder for orthodontists on account of the scouring and polishing effects on the metals.

An Interesting Case.

By Dr. C. Edmund Kells, Jr., New Orleans, La.

In October, 1903, a little Miss of eight presented with the conditions shown in Fig. 1—not very interesting, but yet requiring attention.

The centrals were readily drawn together, Fig. 2 showing the retaining appliances in position.

Space having thus been made for them and the laterals not appearing, in September, 1904, skiagraphs were taken to discover whether or not they were in the jaw.

Fig. 3 shows the result, with the right lateral seen within the alveolar process.

It must be noted that its root is normal, though not fully formed, which is as should be expected at this stage in its development.

The doubt of the presence of the laterals being thus disposed of, nothing further was done, and in due course of time they erupted when the bands were removed from the centrals.

By March, 1906, (the patient now being eleven years old), there being no evidence of the cuspids, other pictures were taken, the result upon the right side being seen in Fig. 4.

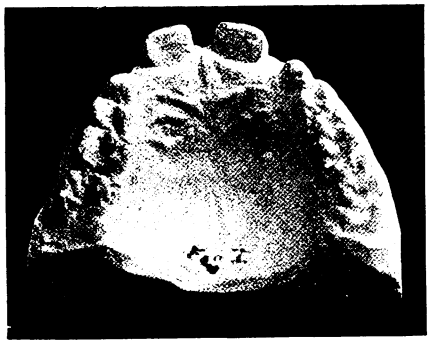


Fig. 1

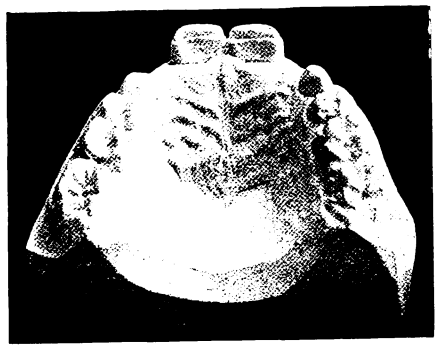


Fig. 2

Fig. 3

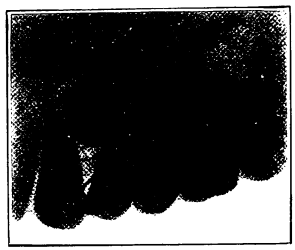


Fig. 4

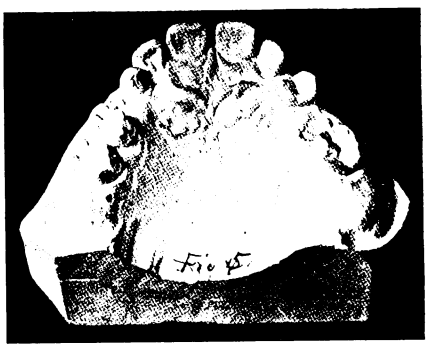


Fig. 5

Fig. 6

Here it must be specially noted that the root of the lateral is now fully formed and normal, and that the cuspid lies apparently at an angle of about 45 degrees from its correct position.

I say "apparently at an angle of 45 degrees," because in a plain skiagraph the picture may be at times misleading in such a detail, owing to distortion.

However, in this case the cuspid did lie at this angle as was subsequently proven by stereoscopic skiagraphs and other means, or rather, results.

For good and sufficient reasons nothing further was done for her until October, 1907, when the conditions were such as shown by the model in Fig. 5, and appliances were put on to properly align the teeth.

There still being no indications of the right cuspid, another skiagraph was taken, the result being shown in Fig. 6.

Here is seen the outer expansion arch, and the ligatures on the permanent lateral and temporary cuspid, while the permanent unerupted cuspid is clearly shown.

Compare this picture with Fig. 4 and it will be seen that the cuspid has migrated in a line with its long axis, and the root of the lateral appears to have been absorbed to a great extent.

Now the writer, to be perfectly frank, never having before seen in his own practice, or read in any of the journals, a case just exactly like this, misinterpreted the picture and thought the appearance of the lateral was due to distortion of the shadow, and the work proceeded.

When it reached the stage as shown in Fig. 7, by means of a stereoscopic picture, the tooth was located exactly as shown by the *natural cuspid imbedded in the model.*

Concluding therefrom that the refractory cuspid would have to be brought down by mechanical means, now follows a description of what was done.

The gum was slit as seen in Fig. 7.

To have exposed the cuspid by trephining the process would have meant the loss of (what I consider) valuable bony tissue; therefore the process was *slit* down to the cuspid and then gently spread apart, thus saving it all, and the cuspid was exposed to view.

A piece of No. 22 iridio-platinum wire was then shaped about as shown in Fig. 8, and the hook was worked up supposedly under the mesial prominence of the cuspid, and a rubber ring was attached to the loop on the other end and secured to a lug on the molar band, all as shown in Fig. 8, which is a skiagraph of the case with the appliance in position.

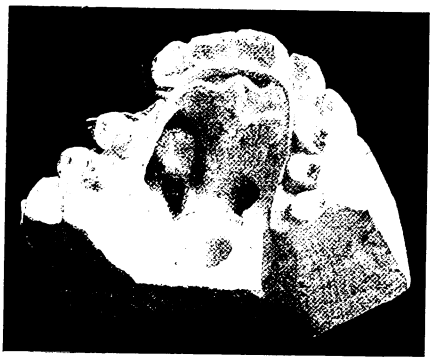


Fig. 7

Fig. 8

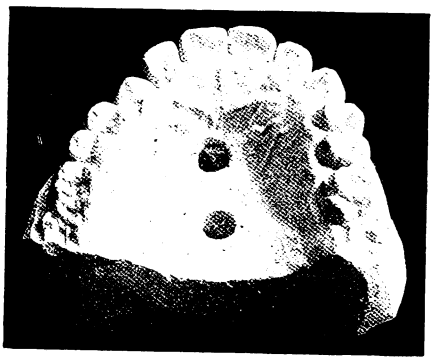


Fig. 9

Fig. 10

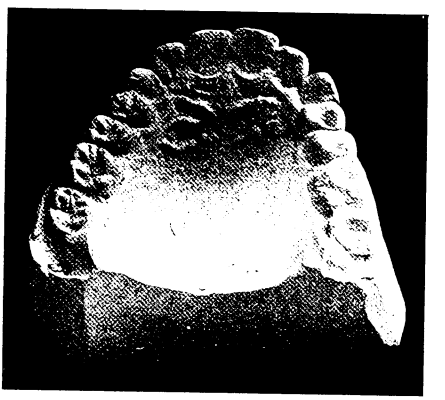


Fig. 11

Imagine my surprise to find by this picture that the hook was not anywhere near where I had thought I put it. Instead of being well up under the mesial prominence, it was merely caught under the point of the tooth, and, of course, it slipped off shortly after the patient left the office.

Upon her return a hook 3/8 of an inch longer was fitted in place and this time, with the picture as a guide, there was no mistake about its placement. The appliance was worn for several weeks, at the end of which time the point of the cuspid having been brought to the surface of the gum, it was removed and the tooth was allowed to erupt by its own volition.

At this time the full retainer was removed and as the point of the cuspid was somewhat within the arch, a finger was soldered to a band on the bicuspid in such a manner as to guide the tooth labially during its further eruption as shown in Fig. 9.

Figures number 10 and 11 show the condition at this writing.

To all appearances the lateral is a solid and vital tooth, and no one would imagine that such a treacherous condition could obtain about its root.

SOCIETY PAPERS

Systemic Pus Poisoning Associated With Diseased Dental Apical Regions.

By Clarence J. Grieves, D.D.S.

A brief outline of this paper was read before the Annual Meeting of The Vermont and New Hampshire Dental Society, May 18, 1910. Later read before the Second District Dental Society, State of New York, November 14, 1910.

When the history of preventive medicine shall have been written, it may be safely said that the stand for "the mouth clean," taken by the dentist, even though he may not have known all of the "why and wherefore," a full decade before his medical confrere grasped the importance of oral hygiene, will make proud reading for all interested in the status of the dental profession.

The rather recent study of the etiologic relations of primary lesions about the mouth, the nasal and post nasal, the pharyngeal and gastro-intestinal tracts to toxæmias of obscure origin only accents the dental axiom long practiced, viz.: that all sources of infection and necrotic tissue about the teeth and alveolus should be "cleaned up," and, if that be impossible, its immediate removal and substitution artificially as of the very first importance in the prevention of greater and graver systemic disorder.

The object of this paper is to present for your consideration a series of cases in the diagnosis and treatment of which the writer was associated as the dentist, covering a period of two years or more, with Drs. William L. Baer and Rhoades Fayerweather, respectively, Chief and Associate in Orthopedics, Johns Hopkins Hospital.

In every instance there occurred a low toxæmia with a slight temperature, frequently subnormal: pronounced pain, usually quite distant from its cause, the teeth and, in some instances, distinct joint involve-

ment. A few cases simulated and were mistaken for tuberculosis, and nearly all were directly traced to minute "blind" apical abscesses of long standing, free from pain and not recognized by the patient: many followed years after some attempt at root canal treatment or crowning of vital teeth, and were overlooked, if not unknowingly produced, by the dentist; in the cases where uncontaminated cultures were obtainable the staphylococcus aureus was the organism.

It is notable in this connection that almost invariably those cases which are arthritic, or of that diathesis, do not respond readily to ordinary dental treatment, and frequently are cured only by extraction.

Several cases from the Johns Hopkins Orthopedic Clinic—Drs. Fayerweather and Ashbury—where no attempt had been made at root canal treatment and filling are to be reported; invariably there was chronic pus retention with temperature, and all of the symptoms of the onset of a polyarthritis; in the diagnosis, after excluding every other possible cause, the tooth or teeth were extracted, and the pain and symptoms cleared up slowly.

The dental diagnoses in the cases reported were made for pulpless teeth by isolation and thermal change; for peridental defects by percussion and sound; the best results, however, were obtained by high digital pressure in the commisures on the alveolus over the apices of all of the teeth; any spot showing the slightest tenderness (and this was not always indicated in the tooth proper) was radiographed. Even more important was the study of these pictures, which was made with the patient in the chair, and the fillings, crown, etc., removed from all doubtful teeth; drainage and regular abscess treatment were established via all canals and, in some instances, through the alveolus; curetting and root ablation were not successful; interference seemed but to increase the patient's pain and symptoms, and the treatment almost invariably ended in extraction.

Root Canal Treatment.

It is not deemed desirable to open again the long-continued discussion of the sterilization and stopping of infected root canals. When canals are accessible, or can be made so, all methods succeed which recognize the cardinal bacteriological and technical principles involved, *i. e.*, thorough sterilization not only of the canal proper but of the dentinal tubuli and canaliculi of the apical cementum, the closing of these microscopic afferent openings and the apical openings by a filling as proof-tight against any solvent action of the apical exudate as the coronal filling is proof against saliva, will always give a tooth free from post-operative infection, *if there be no dyscrasia.* But many canals are

inaccessible, and cannot be made accessible, and anything short of perfection in this apparently simple but in reality very complicated operation, where the best of technique and judgment fails at times, always means, even if there be a period of dental comfort when the inevitable lowered cell resistance comes, a small apical pus area all the more dangerous toxically, because it is accompanied by little pain, and is apt to be dismissed as trivial by the patient, and *the dentist is not consulted, but later the physician is asked to treat a series of obscure and distant symptoms, for which he fails utterly to find the cause.*

Infection of Apical Area.

A few rudimentary facts, commonplace but overlooked, must here be pardoned that we may get the true "modus" of the pus absorption. A bacterial invasion of the apical regions is, of course, productive of all of the phenomena of inflammation proportionate to the numbers and virulence of the infecting organism and general and local cell resistance. Whether the end products of saprophytic pulp degeneration, such as cadaverin, neuridin and putrescin, according to Buckley (1), or the pathogenic organism proper, as the streptococcus, staphylococcus, *et. al.*, and their toxins are the cause, we recognize the condition as one of classical bone infection accompanied by pain proportionate to the infection.

We usually find vessel stasis (2), diapedesis of the leucocytes, exudate of coagulable lymph, positive chemiotaxis of the leucocytes to the invading cocci or phagocytosis where they die, escaping as pus, the bulk of which they form together with peptonized tissue remnants, exudates, dead cocci, etc. There are several layers of fighting phagocytes, reinforcements coming from the rear backed by a layer of fibroblasts, which build a dense fibro-vascular wall, furnishing the last line of defense, mechanical in a way, and composed of dense connective tissue mesh. This wall is the common alveolar abscess sac enclosing the whole infected area. Repetition of these phenomena in the midst of the alveolus produces a typal osteomyelitis.

The infection may be so virulent (and resistance so low) as to invade a large area and sinus, or it may be so benign as to infect but a small area with little or no external evidence, as under a gold cap where there has been subsequent pulp death. If a root canal be filled and any infective element be left the small pus area persists, and, if long continued, local cell resistance is broken down; *pus is formed, only to be absorbed by the fibro-vascular layer, which ceases to protect and becomes a toxic absorptive surface, and a toxæmia occurs via the lymph channels and nodes* (3). This is a typical blind abscess, a condition the writer is

anxious to keep before you; a condition, it must also be remembered, which may be produced directly after pulp devitalization in root canals, hitherto free from infection. These quiescent abscesses are so common about apparently healthy teeth, which have been covered by shell crowns in bridge-work, without the always necessary precaution of pulp removal, that they are almost to be expected. This may be the result of pulp degeneration due to shock, incident to crowning preparations, but no matter what the cause, in the diagnosis, a careful study of good radiographs of these areas is most convincing. While engaged upon this paper, the writer notes the following remarks most pertinent to the subject by Dr. M. L. Rhein (4), who truly says: "It is a fact very pertinent to this subject that a very large percentage of bridges may be constructed with the most perfect skill, as far as the preparation of the roots and the fitting of the bands are concerned, and be made mechanically perfect in every respect, and the next operator may yet find at the end of some of the smaller roots, in the molars especially, small, blind, chronic abscesses, that never have any external opening, and which apparently were not even suspected by the bridge-worker. Those of us who have been giving special attention to radiography have had our attention more and more called to the large percentage of these abscesses that go unrecognized. No one who is familiar with the pathology of this region can deny or overlook the terrible amount of damage that such roots are constantly doing. It is a mild form of blood poisoning that continually vitiates the health of the patient. It is bound to lower the vitality of the individual, and its bad effects generally are shown more pertinently at a period when the patient can ill afford to have them show."

No doubt all of us who are honest with ourselves will admit that we have created such conditions not necessarily by defective technique but because we are attempting the impossible; for instance, the filling of tortuous and inoperable root apices. Criticism will be appreciated on this point only from those who can give radiographic proof of a cure of all such states, or, better still, proof that they have never produced such conditions.

It must also be understood in the cases presented, that the cure of these abscess areas without extraction must, first, be *accomplished quickly,* the patient's suffering and symptoms would not permit two or three months' treatment of a chronic abscess; second, the patient and physician wish to be assured that this pus spot can be blotted out *never to recur* again. Failure to give such assurance was the reason for the invariable and ofttimes sweeping extraction, for which, no doubt, some censure will be heard: free and full drainage, curetting, root ablation and packing, all were disappointing, the tissues granulating only to break

down again. All of this was much too slow to meet the exigencies of the case, and no apologies are here offered for these extractions when viewed in the light of the clinical histories and the resulting rapid cure.

Pus Retention.

It is most desirable in this connection that the line be sharply drawn between the chronic alveolar infections, either by pyorrhea or abscesses which have free drainage and are really open, chronic, granulation surfaces from which pus absorption rarely occurs, and the pus absorption described, *which always arises from retention*. Pus from pyorrhea is marginal and rarely retained (when it is, pus absorption does occur). The alveolar abscesses under discussion are apical, deep burrowing, and only discharge occasionally, if at all. It is common knowledge that the sweeping wounds common to the dental infirmary, caused by extraction of all the roots in the mandible and maxilla, many of which are infected, exposed to mouth infection and impossible to keep clean, heal regularly with no indisposition nor temperature, yet twenty-four hours of pus retention about the tooth roots of the same patient will run a temperature of 103°.

That pus retention will always produce a low toxæmia, such as we are describing, is obvious; witness the usual clinical picture at the onset of any acute deep alveolar infection; before the local phagocytic fight is won, and the different infected foci are centered and enclosed by the fibro-vascular wall, there is pressure absorption of toxins with systemic symptoms, as malaise, muscle pains, chill, temperature, joint pains, etc. Tyson (16) notes the fact that osteomyelitis is among the causes of pyemia which have been overlooked; deep retention of pus, few and distant fistulæ, producing absorption, and it has been noted in the Johns Hopkins Orthopedic Clinic that the temperature in arthritics, with chronic alveolar abscesses, will rise 2/5° to 1°, whenever the superficial tissues heal over, causing a temporary retention.

The writer is cognizant of the fact that pyogenic invasion of the alveolar process, pyorrhea alveolaris, alveolar abscess, etc., have long been associated *as a cause* by authorities on arthritism, as Llewellyn Jones (5), Cave (6), Goldthwaite, Painter and Osgood (7), E. C. Locke (8), and A. H. Tubby (9), with such forms of arthritis as infectious, atrophic and rheumatoid arthritis: he is likewise cognizant of the fact that pyorrhea alveolaris has been associated *as a result* of the arthritic state by such dental investigators as C. N. Pierce (10), H. N. Burchard (2), Kirk (11), Rhein (12), and Talbot (13), and it would seem next to impossible to harmonize these opposing views.

Dental Causes of Arthritis.

Viewed in the ultimate, the very latest work of Kirk on defective metabolism, *et al,* and that of Talbot on acidosis, etc., might readily be correlated when laid beside that of such authorities on arthritic etiology as Hoke and Andrews (14), and Herter (15), who find one of the main causes for arthritism to be auto-intoxication by absorption from chronic intestinal putrefaction. It would thus appear that alveolar infection, at least in the incipiency of alveolar pyorrhea, is one of the *results* of lowered cell resistance due to auto-intoxication, or arthritism and not a *cause,* although likely to be coincident later.

There can be no doubt of infection as a cause in certain well defined cases of infectious arthritis, *i. e.,* post-typhoid, influenza or pneumonia; gonococcal invasion of the seminal vesicles, streptococcus cultures in the tonsillar crypts; operation for the removal of both latter produces results almost magical, but both of these tissues are lymphoid in character, and the type of tissue infected makes a vast difference in the toxæmia produced.

Tyson (16) mentions the common occurrence of joint inflammations of septic origin in scarlet fever, diphtheria, etc.

Barker's viscous cycle, tonsillitis, chorea, endocarditis and rheumatism (?), demonstrably a streptococcus infection via the tonsils and lymphatics, could no more occur through the alveolar process which, while a transitory structure subject to trophic change, is built of dense connective tissue with few lymph channels and nodes, than could pus absorption occur early in pyorrhea alveolaris or in freely draining alveolar abscess, unless there be pressure from chronic retention in minute foci, which it has been the writer's endeavor to describe in this paper. We believe it is now established that pus absorption from small and, as a rule, closed areas about root apices, frequently occurs, usually with marked systemic disturbance and occasionally "a bad joint," and it would appear that if pus was absorbed in alveolar pyorrhea it should produce the same systemic clinical picture, only in a much more marked degree, just as the pus surfaces are larger, viz., temperature, or sub-normal, malaise, severe joint and muscle pains, night sweats, etc. Quite the reverse is the case, and it is rare to find any change in temperature with pyorrhea. The writer again and again has referred such patients with apparently incurable pyorrhea to physicians for systemic diagnosis, and had the report that there was no definite defect. So we conclude that pus absorption does not take place in the early, or even middle, stages of pyorrhea, hence it cannot be the cause of the infectious form of arthritis except a possibility of a secondary infection by ingested pus via the gastro-intestinal

tract.* On the other hand, it is quite easy to see how the cause that produced the arthritis in the joints should affect the joints of the teeth, always open as they are to mixed mouth infection.

These facts should not in the least affect the local treatment; it is always good surgery to clear up local pus foci; if local surgery succeed the causes were local, but if it does not promptly then the causes are systemic, and should be so met.

Conclusions.

First. That minute pus foci can exist about the dental apical regions in the alveolus with little or no pain, practically unknown to the patient.

Second. That these minute areas often follow the most careful dental operations: careless root canal surgery will usually produce acute conditions pronounced in symptoms.

Third. That these pus foci are so frequent as to almost prove the rule, on the roots of teeth which have been shell-crowned without the precaution of pulp removal.

Fourth. That in almost every mouth where there has occurred much caries calling for dental operations, there exists a "lame" tooth kept there possibly by the skill of the operator. It is imperative under any condition, and particularly in arthritics to carefully examine the alveolus about such teeth by manipulation for tenderness, the source of which, if it be present, should be studied by obtaining small radiographs of not more than three teeth and roots; larger pictures are apt to be distorted and definition is most important, so small are the areas involved. If defective spots are found, these teeth should be carefully opened and drained, if drainage will reach the foci, which frequently it will not, and treated. The tooth should be kept under supervision and radiographs taken later to note the cure, which, if not produced, curetting of the alveolus and drainage may help. In the writer's experience, particularly with arthritics, these methods have failed so continuously that he admits his failure and extracts.

Fifth. That the possibilities of modern dentistry for prosthetic replacements should be ever kept in mind, for they ameliorate in a marked degree the results of this seeming ruthless extraction.

*In twenty years of practice the writer has seen but one case of pyorrhea with fever, etc., which cleared up from local treatment and which he reported 17.

Sixth. That it is better a thousand times to err on the safe side and eradicate all infection points by extraction of even too many teeth, than to have the silent pus absorption here described with its dreadful sequellæ of septicæmia and infectious arthritis. In patients of the arthritic diathesis—and it is the dental operator's due that he should be informed of such by the physician if he cannot discover the condition when it exists—the writer would emphasize the greatest care in treating and closing all root canals. The cell resistance, as has been made clear time and again in these patients, is lowered, laying them open to just such insidious infections as we have described, the primary foci of which may be on the alveolus the general symptoms all over the body.

Seventh. That precautions should be taken in the study of radiographs, clear spots such as would seem to indicate tissue destroyed by pyogenic action or pus itself may also be produced by resorption of the root or adjacent alveolus due to necrobiotic conditions, or there may exist old abscess bone areas, which have healed but never received the secondary osseous deposit so necessary to health, so that every clear spot about root apices on the film does not necessarily mean pus retention, which must be confirmed by other general symptoms.

Finally, and at the risk of being trite, we may say that while, as a profession, conservation of the dental organs is our part, and we are convinced it is "the better part," conservatism must not be strained to the point of the retention of teeth in the mouth that are not in every way fit. The possibilities of modern dentistry often tempt us to save a tooth, the probable nidus for a future infection, just to say we have not extracted. Even ultra conservatism will declare the health of the whole body the health of its component parts and *vice versa*. Tooth extraction is not so old-fashioned a remedy that any man need blush to apply it when demanded by the general systemic state, even if the tooth be apparently good.

Report of Cases.

Case No. 1. Small, blind abscess left superior first bicuspid. Root canal indifferently filled with gutta-percha several years before. Diagnosed by digital pressure, no radiograph obtained; infiltrate high apically. Long history of pain in the back of the head and neck, post-cervical glands involved; symptoms simulating incipient tuberculosis and mistaken for such. Tonsils involved; on removal symptoms continued. All the usual dental expedients failed, tooth extracted, case cleared slowly. Arthritic history.

Case No. 2. Abscess left lower first molar draining rarely; tooth filled; duration six months, neck glands involved, temperature 99.2-100, frequently sub-normal; pain cervo-occipital, intense at times. The patient, a trained nurse, would not allow pictures or dental treatment, had tooth extracted, cleared in two weeks.

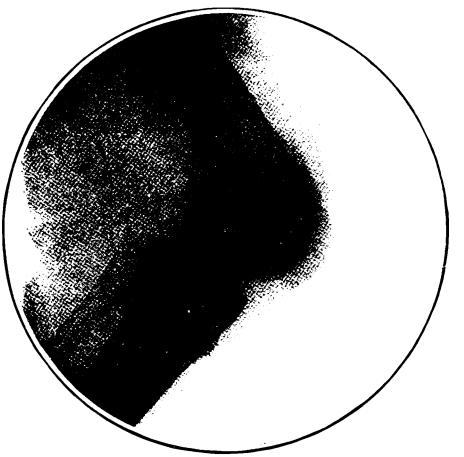


Fig. 1

Case No. 3. Periodic rheumatoid joint history, knees, ankles and elbows, covering two years; temperature 100-101.2. Diagnosed as a tonsillar infection, operation for which and orthopedic joint treatment enabled the patient to walk by aid of crutches. Patient after four months no better; dental examination discovered pus cervically about three of the four third molars, the fourth was carious, treated and filled. The two superior and right inferior on extraction contained each several peridental abscesses. Case cleared up slowly; can now walk after one year's treatment; all arthritic symptoms disappeared. The radiograph (Fig. 1) shows condition of knee joints when treatment began.

Case No. 4. Markedly arthritic, duration two years, hands and back involved; pain general; acute in cervical region; no visible joint changes; temperature 100-97, tendency to sub-normal, taken carefully for several months. Radiograph of suspected tender areas in alveolus showed abscess right superior first molar (Fig. 2 m) and resorption root right superior first bicuspid (Fig. 2 n) under defective bridge; conditions vile, no attempt having

been made at root treatment or filling. The lower anterior four incisors, on which equally defective crowns had been set years before, contained blind abscesses (Fig. 2, a, b, c and d). No fistulæ had occurred in any of these, and the patient suffered no dental inconvenience. All of these roots failing to respond to the usual treatment, the patient's condition was such that extraction was demanded. The patient is thoroughly well after ten months.

Fig. 2

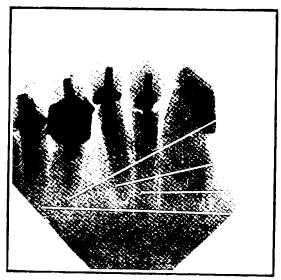


Fig. 3

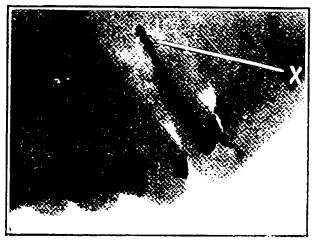


Fig. 4

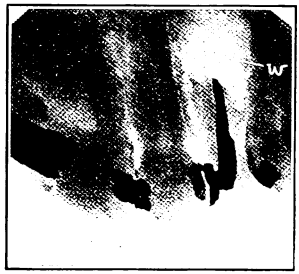


Fig. 5

Case No. 5. Abscess, which drained rarely, left superior lateral incisor; patient not arthritic but cachectic, resembling tuberculosis, loss of weight, night sweats, sub-normal temperature, etc. Marked muscle pain about the head and eyes oculist failed to relieve. Radiograph shows fine gold root-canal filling extending beyond the apex at x, Fig. 4, with abscess and resorption. Root ablation and drainage (Fig. 5, w) cured the case in two months.

Case No. 6. Two of the most virulent staphylococcus blind abscesses at x and w, Fig. 6, left superior first and second bicuspids, it has ever been the writer's misfortune to meet. These teeth carried excellent porcelain crowns set five years before with no apparent attempt at root treatment. After long

treatment, which failed, extraction cleared the case of all gastro-intestinal symptoms in one month.

Case No. 7. Not arthritic, pain post-cervical, continuous for one year, tenderest upon digital pressure over inferior left first bicuspid. Radiograph shows blind abscess at x, Fig. 7. Careful root-canal work cleared case in two months.

Fig. 6

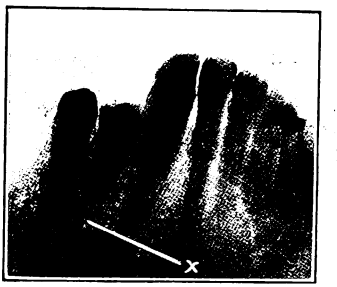


Fig. 7

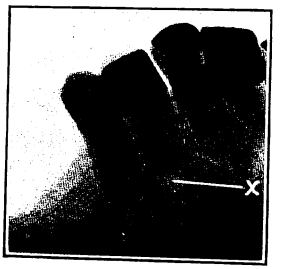


Fig. 8

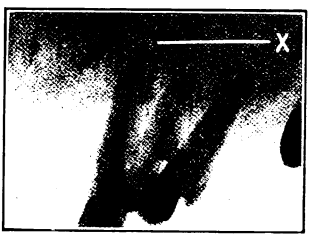


Fig. 9

Case No. 8. Arthritic; left shoulder and muscles involved. Digital pressure showed infiltrate over crown on right superior first bicuspid. Radiograph (Fig. 8) gives cause, a blind abscess at x, which responded to crown removal, root-canal treatment and filling.

N. B.—Compare with case 14; the ease with which this was drained was due to the location of the abscess area directly over the apex, instead of mesial to it as in 14.

Case No. 9. Fig. 9 x. Small, "blind" apical abscess on right superior canine, illustrating that the best of root-canal work will fail occasionally in an arthritic: the usual symptoms had persisted over one year; all treatment failed save extraction; examination showed the apical cementum necrotic.

Case No. 10. Well-defined blind abscess diagnosed by digital pressure, left superior central bearing post crown (Fig. 10 x). No arthritism noted; cervical muscle pains; case responded to crown removal, drainage and curetting; four months.

Case No. 11. Fig. 11 x, a blind apical abscess, mesial buccal root, right superior first molar, diagnosed only by alveolar tenderness to digital pressure. Root-canals

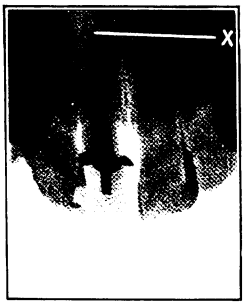


Fig. 10

Fig. 11

Fig. 12

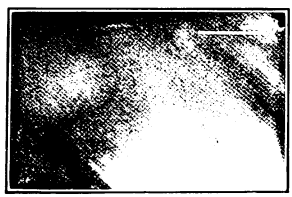


Fig. 13

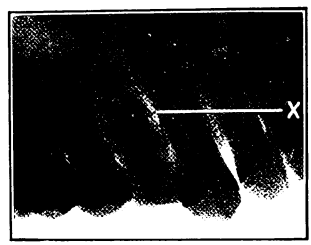


Fig. 14

partially filled, patient markedly arthritic; hemicrania; cervo-occipital pain; drainage and ablation of root apex failed; extraction and case cleared in two months.

Case No. 12. Fig. 12 x′ and x″, two blind apical abscesses, right superior second molar; gold shell-crown some years without pulp treatment; arthritic, enlarged finger joints; all treatment failed except extraction.

Case No. 13. Fig. 13 x, small, blind abscess area, apex left superior canine; not arthritic, symptoms simulating incipient tuberculosis; root-canal poorly filled, responded to drainage; cured; time three months.

Case No. 14. Fig. 14 x, blind abscess mesial-proximal surface, roots left superior first bicuspid carrying post-crown; root apices not filled. Arthritic family history, muscle and joint pains, sub-normal temperature lasting some time. Drainage through root impossible, for the trouble was not apical; curetting produced a deep pocket which would not heal; extraction cleared case in one month.

Bibliography.

1. Buckley, J. P.: "Modern Dental Materia Medica, Pharmacology and Therapeutics."
2. Burchard & Inglis: "Dental Pathology and Therapeutics."
   Ziegler: "Pathology."
   Muir and Ritchie: "Manual of Bacteriology."
3. Morris, R. T.: "Infection of the Lymph Glands and Nodes."
4. Rhein, M. L.: Discussion of Peeso's Paper, N. Y. Odontological Soc., May, 1910. *Items of Interest.*
5. Jones, R. Llewellyn: "Arthritis Deformans."
6. Cave: *Lancet,* Aug. 3, 1901.
7. Goldthwait, Painter and Osgood: "Diseases of the Bones and Joints."
8. Locke, E. C.: "The Treatment of Non-Tubercular Chronic Arthritis."
9. Tubby, A. H.: "Arthritis Deformans."
10. Pierce, C. N.: *International Dental Journal,* Vol. VI., p. 367.
11. Kirk, E. C.: "Constitutional Elements in Certain Dental Disorders." *Maryland and District of Columbia Proceedings,* June, 1908.
    "Dental Relationship of Arthritism," *National Dental Association,* July, 1909.
12. Rhein, M. L.: "Oral Expressions of Malnutrition," *Odontological Society,* 1896.
    "Pyorrhea Alveolaris," *Chicago Dental Society,* 1899.
13. Talbot, E. S.: (a) "Interstitial Gingivitis"; (b) "Acidosis Indicanuria, Internal and External Secretions, the Effect Upon the Alveolar Process and the Teeth," *Dental Cosmos,* Sept., 1908.
14. Andrews and Hoke: "A Preliminary Report on the Relation of Albuminous Putrefaction of Intestines to Arthritis (Rheumatoid and Osteo) and its Influence upon Treatment."
15. Herter: "Lectures on Chemical Pathology."
16. Tyson: "Practice of Medicine."
17. Grieves, C. J.: "A Case of Acute Hematogenic Calcic Pericementitis. *Dental Cosmos,* July, 1900.

The Report of a Case of Fracture and Diastasis of the Upper Bones of the Face from the Skull and the Method of Treatment Employed.

By JOHN SAYRE MARSHALL, M.D., Sc.D.,
Examining and Supervising Dental Surgeon, U. S. Army.
Read before the Cleveland Dental Society.

I am greatly honored this evening in being your guest. It is also a great pleasure to be with you, for I recognize among those present many old friends whom it gladdens the heart to greet again, one of whom I clasped hands with not many months ago on the other side of the world; not the under side, by the way, but the other top side of the world, where the glorious Stars and Stripes wave proudly to-day, to gladden the hearts of America's globe-trotting children and to uplift and civilize a race of people to whom liberty of thought and speech and equal rights before the law were, until recently, as far removed from realization as is heaven from earth.

In accepting the invitation to read a paper before you, I did so with considerable hesitation, not knowing what sort of a subject would be most interesting to you. Your worthy President, however, came to my rescue by suggesting that any subject along the line of surgery comprehended in the field covered by our specialty would be acceptable. I therefore have chosen to present for your consideration and discussion a recent case of fracture and diastasis of the upper bones of the face from the skull and the method employed in its treatment, and if I shall succeed in leaving with you a few thoughts that may prove helpful in your future practice, I shall feel that my labor has not been in vain.

The class of injuries to which this case belongs is by no means common, and yet any day some one of you may be called upon to treat a case of similar nature; for since the introduction of the passenger elevator in our high buildings and sky-scrapers, these cases have become more common. It has been my fortune during the last twenty-five years to be called upon to treat several, to be more exact, seven (7), and with the most pleasing results, although some of the cases seemed at first sight to offer but little hope of recovery by reason of severe shock or concussion of the brain. Some few cases, however, escape shock of severe type, and of concussion. In the former cases only palliative and sustaining treatment can be applied until the nervous and cerebral symptoms have subsided; while in the latter, plans can be immediately laid for the reduction of the fractures and the construction of whatever apparatus is decided upon to maintain the fractured bones in normal apposition.

In my first case, which occurred in Chicago, in March, 1887, and was treated at St. Luke's Hospital, I devised the method of treatment which I have followed with slight variations in all my succeeding cases, and which has given such uniformly good results that I have seen no reason for changing it. The method devised was an adaptation of the Hayward or Kingsley interdental splint, supported from the cranium by means of a leather cap, laced tightly to the head. Later this cap was constructed of net, reinforced by leather, and, in the case to be described, the head was shaved and the splint supported by adhesive straps attached to the scalp.

The first three cases which came into my hands I used, at the suggestion of a few medical friends in Chicago, to form the basis of a paper which I read at the International Medical Congress held in Berlin, Germany, in 1890.*†

Injuries to the upper bones of the face, which cause comminuted

*Transactions, Tenth International Medical Congress.

†Marshall's Injuries and Surgical Diseases of the Face, Mouth and Jaws.

fractures and separation from the bones of the cranium, are always the result of a great violence, such as the passage of a carriage wheel over the face; falling from a considerable elevation and striking on the face; the kick of a horse; a blow in the face from some heavy missile hurled with great force; a gunshot wound; the overturning of a carriage upon the occupant, or other heavy crushing force.

These injuries are always serious, and often prove fatal, either from shock, hemorrhage, direct injury to the brain, or from secondary complications.

In those cases which survive the shock of injury and which escape immediately serious complications of the brain, a favorable termination may be looked for, and in many instances, if properly treated, with very little deformity. This, however, will depend very largely upon the character and location of the particular injury, the success obtained in readjusting the fractured and dislocated bones, and maintaining them in their normal positions.

Much damage has been done in the treatment of some of these cases, however, by the meddlesome anxiety of the surgeon to remove all loose spiculæ of bone. A greater mistake could not be made, because such loss of bone tissue always results in an ugly scar. It makes no difference how much the bones may be comminuted so long as the fragments have an attachment to the soft tissue, for necrosis under such circumstances will not, as a rule, take place. The only case in which there was any deformity following my method of treatment in the cases referred to above was one in which the hospital interne had cut away some loose fragments of bone at the base of the nose and frontal sinus, before I had seen the patient. This, of course, resulted in a depression at that location which might have been avoided had these fragments been allowed to remain.

History. The history of the case which I present this evening for your consideration is as follows: E. J. S., Private first-class, Engineer Corps, U. S. Army, aged 29, white, was admitted to the Division Hospital, Manila, P. I., on February 20, 1910, at 1:15 a. m., suffering from fracture and diastasis of the upper jaw from the bones of the face and head; fracture of the mandible at the angle on the left side; fracture of the external wall of the antrum of Highmore on the left side and fracture of the nose at its base. Incised wound in left side of upper lip. Loss of sensation in upper lip and left side of lower lip. His general condition, considering the gravity of the injury, was good. Temperature, 97 F.; pulse, 76. Suffering considerable pain. Morphine, ⅛ gr. (8 mgm.), atropine, 1-100 gr. (65 mgm.), was given hypodermatically for relief of the pain, and 1 oz. (30 cc.) of sherry wine as a stimulant, and put to bed.

Cause of Accident. The injury occurred in the following manner: S. had been engaged with several other men during the forenoon of the 19th, in landing horses from the transport used by the invading or attacking army at Olongapo, Luzon, during the maneuvres, February, 1910. On reaching the shore, S. had attempted to mount the horse in his charge, which was acting badly from fright and nervousness, and in the tussle the horse fell against the end of a pile of lumber, crushing the face of his rider between his shoulder

Fig. 1

and the jagged ends of the lumber; with the result just described. When picked up he was conscious, and at no time thereafter did he lose consciousness. Hemorrhage was very severe at the time of injury. As soon as his wounds were dressed he was placed upon a fast launch and hurried to the Division Hospital, at Manila. When he left Olongapo it was not expected that he would live to reach his destination, so his comrades, in the goodness of their hearts, took up a collection and forwarded it to Manila to furnish flowers for his funeral. Our soldier boys have big and tender hearts.

Treatment. February 20th, at 9 a. m., the day of admission to the hospital, the condition of the patient was so good it was decided to begin the treatment for reduction of the fractured and dislocated bones at once.

Upon a more careful examination of the case preparatory to treatment, it was found that the superior maxilla was freely movable in all

directions, viz., up and down, forward and backward and laterally to the right and left. When the parts were at rest the mouth was open as shown in Fig. 1. The molar teeth of the upper jaw rested upon the molars of the lower, while the anterior teeth were separated by ¾ of an inch (1.9 cm.), causing a disagreeable lengthening of the face. It will also be noticed that the median line of the mandible is carried some distance to the left, due to the displacement and over-riding of the fracture at the angle. This condition greatly increased the difficulties in any line of treatment that might be decided upon. The injury to the maxilla and the bones of the nose had caused so much swelling as to completely occlude the nasal passages; thus making it imperative that whatever treatment was adopted must make provision for free breathing through the mouth. It was therefore decided to employ the form of interdental splint that had served me so well in the past.

The mouth was thoroughly irrigated with a saturated tepid solution of boric acid, and an impression of the upper jaw taken in modeling compound. This was accomplished after some little difficulty to the operator and considerable suffering to the patient who, by the way, refused to take an anæsthetic under any circumstances.

The impression cup, charged with the modeling compound, was introduced into the mouth by an assistant, while I carried the superior maxilla to its normal position, by upward pressure applied over the second bicuspid and first molar teeth. When the cup was in position, pressure was applied to the under surface in the usual way, and the material moulded to the buccal surface of the gums. Ice-water was used to chill the compound, and by the aid of the assistant the impression was removed, while by lateral and upward pressure upon the sides of the maxilla at the gingivo-buccal commisure the bone was maintained in its position, and allowed the withdrawal of the impression without deformation.

An impression of the mandible was also taken with the same material without any attempt to reduce the fracture. The superior maxilla was held upward in its proper position while the lower impression was being taken.

Modeling compound was chosen as the impression material, because experience has taught me that it is the best material that can be used in these cases. Plaster of Paris was out of the question on account of the great mobility of the fractured bones, and the excessive flow of saliva. It would be next to impossible to remove a plaster impression that had set hard enough to fracture without doing great injury to the already badly traumatized tissues, while the excessive flow of saliva would greatly retard the setting of the plaster or prove a failure altogether.

The patient was now put to bed and given another injection of morphine, ⅛ gr. (8 mgm.), and atropine, 1-100 gr. (.65 mgm.), and 1 oz. (30 cc.) of sherry wine, as the ordeal of taking the impression had been a severe one. Diet, liquid. Mouth and nose to be irrigated every two hours with boric acid solution.

Plaster casts were next made from the impressions. The cast of the lower arch was divided with a saw at the line of the fracture and the two parts assembled upon the cast of the upper arch, the teeth being

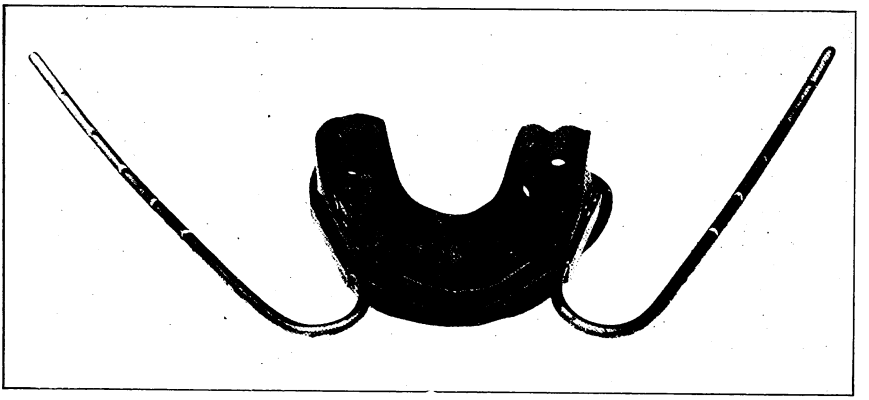


Fig. 2

brought into proper occlusion and the several parts united on the opposite side with fresh plaster. As soon as this was set the whole was transferred to an articulator.

The next step consisted of separating the casts by turning down the screw of the articular until the bite was opened ⅜ of an inch (.952 cm.) to allow for making openings in the splint for the purposes of breathing and feeding. The casts were next coated with varnish and covered with tinfoil well burnished down. Upon this was moulded a wax splint covering the teeth and of the desired form; metal sockets were imbedded in the sides of the splint over the bicuspid teeth. The splint was then chilled in ice-water, removed from the models, and flasked just as you would flask a case of artificial teeth. The openings in the splint were not cut completely through until after it was vulcanized.

Record of Case.

February 21st. Has had a fairly good night. Morning temperature, 98.2 F.; pulse, 76. Sat for photograph (Fig. 1), and radiograph. Fig. 1 shows the condition of the patient when received in the hos-

pital. The radiograph was a failure as the machine was not working properly. The patient's head was then shaved preparatory to inserting and adjusting the splint. This method was adopted from necessity, Manila having no shop where a suitable cap could be made. At 10 a. m. the splint was placed in position, using the same tactics as was employed in taking the impressions, and it was found to fit perfectly. The arms were then slipped into the sockets and the apparatus was ready for final adjustment. Fig. 2 shows the splint before insertion. Strips of adhesive plaster were then cut of sufficient length to reach from the arms over the

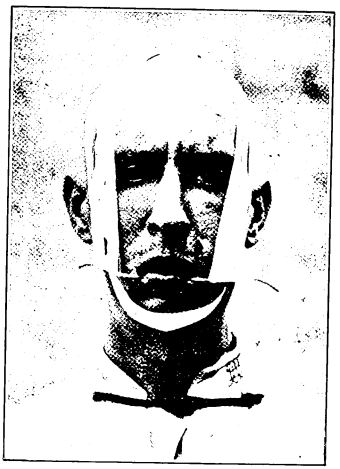


Fig. 3

Fig. 4

head and well down on the opposite side. One of these was fastened to each arm by doubling the end upon itself. Even, upward pressure was then exerted upon the arms until the maxillary bone was carried to its normal position or would go no further, and then held in position by the adhesive strips. A second set of adhesive strips was placed a little further back, giving a slight posterior drag to the splint.

A heavy ligature was next passed around the lower bicuspid teeth upon the left side, and forward traction made upon it to reduce the fracture of the mandible. An adhesive strip was then placed under the chin and by the combined forward traction and upward pressure upon the chin, the teeth of the lower arch slipped into the indentations prepared for them in the splint, and the mandible was held in its normal position by the adhesive strip. This splint, as stated before, is an adaptation of the Hayward or Kingsley splint to the upper jaw. The arms, which are

made of steel, are employed to suspend the apparatus from the skull. The notches cut in the arms are to prevent slipping of the bandages when the skull cap is used. In this case the head was shaved and the apparatus suspended from the skull by the adhesive strips mentioned before. The depression and flattening at the bridge of the nose were overcome by elevating the bones by the aid of a probe. Ordered irrigation with boric acid solution every two hours. Fig. 3 shows the apparatus in position. (This photo was taken one month after the injury.) On the evening

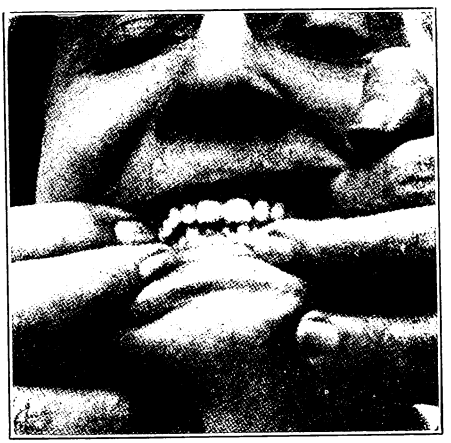


Fig. 5

of February 21st temperature was 98.6 F.; pulse, 90. Suffered considerable pain during the night, allayed by hypodermatic injection of morphine.

February 22nd. Morning temperature, 97 F.; pulse, 92. Evening temperature, 98.6 F.; pulse, 90. Says he feels much better.

February 23rd. Doing well.

February 24th. Wound in lip suppurating. Stitches removed and wound irrigated.

February 25th. Abscess developed in lip and cheek, left side.

February 26th. Opened abscess, probe passes into left antrum.

February 28th. Feeling very comfortable. Swelling disappearing.

March 1st. Complains of being hungry. Semi-solid diet ordered. Abscess in cheek due to necrosed bone in external wall of left antrum. Dressed daily.

March 14th. Removed splint for thorough cleaning. Superior maxilla retains its normal position, but has slight movement. Splint reinserted.

March 15th. Abscess still discharging slightly. Probe still enters the antrum.

March 18th. Complains of throbbing pain extending to the right ear and right side of the head.

March 19th. Pain has disappeared. Removed small fragment of necrosed bone from external wall of left antrum.

March 21st. Removed splint to note progress. Fracture of mandible united, no movement. Superior maxilla maintains its normal position. Is still very slightly movable. Fractures evidently united one month after injury. Splint discarded and jaws bound together with adhesive strips. Placed on liquid diet.

March 22nd. During the night complained of pain in mandible and unable to rest. Morphine hypodermatically at 11 p. m. Rested well after morphia.

March 23rd. Feeling better.

March 28th. Weight fallen to 118 pounds.

April 5th. Removed adhesive strips, and ordered light diet. Left antrum still discharging. Paralysis of sensation in upper lip and left side of lower lip improving.

April 6th. Solid food, steak twice per day, egg nogs t.i.d.

April 18th. Weight, 125 pounds, feeling fine. Abscess in left antrum cured.

May 2nd. Weight, 128 pounds; ordered full diet.

May 8th. Weight, 128 pounds.

May 22nd. Weight, 129 pounds.

May 30th. Sat for photograph (Fig. 4), which shows normal condition of the face. At no time during the history of the case did the temperature reach 100 F.

June 1st. Returned to duty, cured, and with no deformity except the scar in the lip. Fig. 5 shows a perfect occlusion of the teeth.

About six weeks later the patient returned to the hospital complaining of pain in the right ear, but as I was just leaving Manila on sick report, I did not learn of the nature of his trouble or whether or not it had anything to do with his original injury.

Columbus Barracks, Ohio.

The Possible Chemical or Pathological Effects of Cement Fillings.

Dr. Max Kulka, Dentist in Vienna.

Delivered at the 8th Annual Meeting of the Austrian Stomatological Society, in Graz, December, 1910.

The question as to the possible danger to the pulp, risked by the use of cements containing phosphoric acid, has been in debate for a long time, and with it has naturally followed the query—how can these dangers, if they exist, be avoided? Before going into these questions, we must first admit that phosphoric acid could be a source of danger, and that this is so, we recognize by the fact that many cements have been manufactured on the theoretical basis of overcoming this factor. We are restricted to the discussion of such cement powders and acids whose composition demands strong basic or slightly acid affinities. Unfortunately, we are apt to forget that neither powder nor acid is used alone, but that we use a well triturated mixture of both; if I were to forget this fact, then you could with justice disregard my opinion in this discussion.

An analytical study of the component parts of the different dental cements is not in our province, and belongs rather to the domain of the commercial chemist.

We are interested in the question—To what extent do dangerous substances enter into the composition of the ordinarily used cements before and after they are hardened?

To answer these questions, I determined to ascertain how much free phosphoric acid there is in the commonly used cements before and after the operation of filling a cavity.

Another interesting problem lies in the question—How does the free acid penetrate the dentine to attack the pulp, how long does this take, and how much acid reaches the pulp?

Considerable work has already been done concerning the physiological action of phosphoric acid.

Lartschneider failed to demonstrate death of pulp, purulent degeneration of pulp, or periosteal inflammation in a single instance, even though in one case he allowed a phosphoric acid filling to remain in a cavity for nine months.

Powel, on the other hand, found a pathological effect on the pulp in dogs, even through thick layers of dentine.

Though the question as to the possible dangers from phosphoric acid is not settled, yet the fact as we all know, that we often find death of pulp after the placing of a gold crown on a tooth having a vital pulp, seems to speak in favor of such a danger existing. But we must not

conceal from ourselves the fact that in such a case we had destroyed the natural protecting substances of the dentine, and so to speak, caused an injury to the dentine.

Of particular interest remains the still unsettled question—Is the phosphoric acid as a substance active, or does its activity depend upon the fact that it is an acid salt?

The possibility of such a difference can easily be imagined, when we think of the potent physiological action of some very weakly acid reacting substances, such as carbolic acid or hydrocyanic acid, when compared with the minimal action of some of the mineral acids.

Phosphoric acid, as a component part of a large number of related animal salts, must be considered purely from the aspect of its acid strength.

Before I go into the questions at issue, I will take this opportunity to make clear, in as fundamental a way as possible, the relation existing between acids and acid substances, so that there may be no misunderstandings, and that my research may be more intelligently considered.

In chemistry, the hypothesis of Arrhenius, based on an electro-chemical reaction, and known as the Ionic theory, plays an important rôle. According to the latest publications, an equally important part seems to be played by it in the domain of physiology.

Electrolitic Dissociation.

There exist a great number of chemical amalgams which, if dissolved in water—and only such as are soluble will be considered—are capable of conducting an electric current. To such substances the above hypothesis applies. Their component parts are, to a certain extent, dissociated, and when compared are found to carry an equal charge of electricity. This splitting apart is known as electric dissociation. The parts are known as ions, those which go to the positive pole as "kations," and those to the negative pole as "anions."

Thus sodium chloride is composed of the Kation "Na" (sodium), and the anion Cl (chlorine), and yet the solution of this salt shows absolutely no evidence of the presence of the metal sodium, or of the greenish-yellow, penetrating smelling chlorine. Only after we take away their electric potentialities, by such a method as electrolysis, do we recognize the chemical identity of the component parts.

We determine the amount of dissociation, leaving out of consideration the character of the liquid used for solution, and its temperature, according to the concentration of the separate ions, measured according to the mass action.

Acids.

Combinations which can, or do, split off exclusively to the kation H. (Hydrogen) when in solution, are called acids.

Bases.

Combinations which select the anion OH (Hydroxyl) are called Bases.

Water, H_2O=H—OH, peculiarly enough, is a combination of these two ions, and, therefore, according to our definition, both an acid and a base.

Strength of Acids and Bases.

Since the specific action of an acid depends upon the concentration of its hydrogen ions, and that of bases upon their hydroxil ions, so we measure the strength of an acid or base by dissociating these ions.

Just as we have small buildings and sky-scrapers, so we also have some acids which allow of considerable ionization, and others that practically do not allow of dissociation, even though they are called acids, as, for instance, silicic acid. Thus we see that we cannot draw conclusions regarding an acid because of its name.

Take water itself, which we have shown is composed of just those constituents necessary for either an acid or base, and yet it is practically impossible to dissociate it, at least in measurable quantities.

Salts.

If we replace an acid solution which contains considerable hydrogen, by a basic solution which contains considerable hydroxyl ions, we obtain a salt.

A salt is therefore an acid whose hydrogen molecule has been replaced completely, or in part, by a metal; or, a salt results in a solution by the union of an acid and base with the formation of water.

For instance, if you mix a strongly cauterizing solution of sodium hydrate with an equal amount of an equivalently strong hydrochloric acid solution, you satisfy the affinities of both the hydrogen and hydroxl, which join to form water (H_2O), and the result is a harmless sodium chloride solution.

Polybasic Acids.

If a molecule of an acid contains more H atoms than can be attracted by the kation, and we substitute an element for one hydrogen atom, we form a primary salt; if we replace 2 atoms of hydrogen, we form a secondary salt, etc.

Acid Salts.

Acid salts are those in which only part of the hydrogen has been exchanged for the metal, and hence is still available.

Such an acid salt can certainly produce a more acid solution than many of the so-called acids, if the remaining available hydrogen goes on to a further dissociation; in other words, further than the hydrogen of the acid under comparison.

The polybasic acids, by which we mean those acids in whose composition there are sufficient hydrogen molecules to allow of replacement

by more than one metal; they have the peculiarity that their several hydrogen molecules show different strengths. The first hydrogen molecule, usually dissociated, is the strongest; the second molecule less strong, etc.

From the above we conclude: That the acid salts can certainly produce more acid than the weaker acids themselves, but not more than the stronger acids.

Hydrolysis.

In aqueous solutions of salts, if the one or both component parts (acid and base) are weak, then the liquid used for solution can play a part, even if minimal, in the process of dissociation.

If the base is weak; that is, permits of but a weak ionization, then its molecule and the hydroxyl of the water combine as an electrical neutral molecule, while the solution itself, because of the hydrogen present, reacts as an acid.

If the acid is weak, then the solution of the salt contains a poorly ionizable acid and a free base, and in consequence the solution has a basic reaction. So, for instance, a solution of potassium cyanide reacts alkaline and smells acid.

If both components are weak, then both of the above conditions obtain. We call these phenomena hydrolysis.

The reader will pardon this introduction, which I am compelled to make, because the dental literature in the past contains many confusing ideas concerning the meaning of the words acid, sour, and salt, and because the following will now be better understood.

Orthophosphoric Acid.

Solubility of Phosphates.

Orthophosphoric acid is a tribasic acid. Its first hydroxyl group represents a moderately strong acid, its second a very weak acid, and its third is hardly capable of dissociation. All alkaline salts of phosphoric acid are soluble in water, but salts of other metals are insoluble in water except the primary phosphate.

Since most of the other alkaline metals are unfit for use in cements, except possibly in minimum amounts, it concerns us to study the passage of acids through the dentine only in relation to phosphoric acid and the primary phosphates.

The primary phosphoric acid hydroxyl can no longer be detected in mixtures of the cement preparations tested, so we are narrowed down to the consideration of the primary phosphates. These are known to be salts with a weak basic radical, and admit of a corresponding small amount of hydrolytic dissociation.

And further, since the third phosphatic hydroxyl fails to show an acid reaction, we can, with justice, say:

"Through the introduction of a mixed cement into a cavity, we bring an acid (primary) salt of a weak acid into a tooth, which, through hydrolytic action, can be made to act like a strong acid, and coming in contact with the dentine eventually approach the pulp!"

Now, as to the quantitative portion of my problem, the amount of free hydracid still remaining in the mixture I determine by titration.

By titration we understand the quantitative estimation of the strength of a chemical, by adding to it drop by drop another solution of an opposite substance of known strength. If we possessed a substance which would make it possible to accurately tell when these two opposite solutions have neutralized each other, then the measure of the known solution used would indicate the strength of the tested solution.

Normal Solutions.

To estimate the strength of an acid, we use as a neutralizing agent the alkali potassium or sodium hydrate. A solution containing the weight in grams of one molecule of the selected alkaline hydrate dissolved in one litre of water, is known as a "normal" solution. If to one litre but half of the molecular weight is added, it is called a "half-normal" solution; and if but one one-hundredth of the molecular weight is used, it is designated a "one-hundredth normal" solution. These are abbreviated, respectively, n, $n/_2$, $n/_{100}$.

The solution is dropped from graduated burettes into a known quantity of the test liquid, until, under constant stirring, a change in color is noted in the indicator used.

The reading on the burette will indicate the amount of acidity of the solution under consideration.

Indicators. Theories Concerning Them.

The indicators are dye-stuffs, which, according to their chemical composition, are recognized as acids. They are very weak acids, and therefore give when in solution but a trace of hydrogen. They are characterized by the property that their intact molecule has a different color to that of their dissociated molecule. If you place such an indicator in an acid solution, then the presence of an already available hydrogen atom prevents the ionization of the indicator, and consequently we get the color of the intact indicator. If, however, we remove the acidity by the addition of an alkali, then the indicator begins to dissociate, and instead of the color of the intact molecule, we obtain the color of the indicator ions, which gradually deepen as more alkali is added.

Because of these facts, it is possible to determine the acidity of a

fluid very accurately, and furthermore the reaction of the indicator refers exclusively to either a free acid or a free base.

Titration of Phosphoric Acid.

To titrate the strength of the primary hydrogen radical of phosphoric acid, we could use as an indicator methyl orange, which, however, fails to show the presence of the second hydrogen radical; hence it follows that if bases are present in the solution, the change of color will occur considerably later, since possibly only a portion, or even all, of the base may be precipitated as a secondary phosphate, and the remaining primary salt, through hydrolysis, may retain its acid reaction towards the indicator.

I have found the occurrence of a precipitate (even though methyl-orange does not show at first a change in color) shows the presence of the first hydrogen radical with a fair amount of accuracy.

As indicator for the second hydroxyl group, I use phenolphtalein, and continue the titration until the solution assumes a distinct purple-red color.

My results showed that a very small portion, averaging about $^1/_{10}$ of the alkali, combines in the precipitate to form a tertiary phosphate. Because of this fact, I filter the solution after the completion of my titration, dry the filtrate, heat and weigh it as pyrophosphate.

I obtain the amount of alkali that is present in the solution by following the formula:

$$v = \frac{\text{Pyrophosphate found}}{\text{Total amount of alkali added, as representing the pyrophosphate.}}$$

From this I have formulated the following equation:

$$x.\ H_3\ Po_4 + y.\ MH_2\ Po_4\ [+a\ KOH] = b.\ K_2\ Po_4 + c.\ M_3\ Po_4\ .\ d\ K_3\ Po_4$$

(In which M signifies the metallic valency of the metal employed)

Thus we get

$$v = \frac{2b}{a} = \text{the above relationship of the phosphates.}$$

$$a = 2b + 3d$$

$$y = 3c$$

$$x + y = b + c + d$$

Hence, $x + y = \frac{1}{4}\ (a.\ [v+2] - 2x)$ = the equivalency of the second hydroxyl, and x = the valency of the first hydroxyl.

If there is no first hydroxyl present, then $x = 0$, $y = \frac{1}{4}a.\ [v+2]$

The relationship of the pyrophosphate I determine only in the pure cement acids, and use the results obtained in the titration of the mixed cements, judging that the remaining cement acid will not change much in the preparation of the mixture.

TABLE I.

Preparation	Amount Used Acid : Powder	Specific Gravity	Volumetric Weight	Volumetric Amount of Free Cement Acid
A. K. Z.	63 : 100	2.008	1	1
Harvardid (new)	54 : 100	2.110	1.05	0.95
Phenakit	59.5 : 100	2.123	1.06	1.02
Astral	59 : 100	2.263	1.13	1.09
Schoenbeck's Silicate Cement	57.6 : 100	2.272	1.13	1.07
Harvard Cement	40 : 100	3.292	1.64	1.21

TABLE II.

Titration of the pure Cement Acids with $n/_2$ K O H.

Preparation	Amount by weight	x	a	v	$x+y$	$2x+y$
A. K. Z.	1	2.8	18.1	0.9094	11.8	14.5
Harvardid	0.95	3.7	17.3	0.8675	10.5	14.2
Phenakit	1.02	0	16.5	0.9121	12.0	12.0
Astral	1.09	5.6	24.9	0.9736	15.7	21.3
Schoenbeck	1.07	8 3	28.2	0.9662	16.7	25.0
Harvard Cement	1.21	1.2	20.1	0.8479	13.7	14.9

x=number of ccm. necessary to cause a precipitate.

a=number of ccm. necessary to cause a change of color with phenolphtalein.

v=Relative amount of pyrophosphate found to total amount of pyrophosphate.

x+y=number of ccm. of $n/_2$ KOH used to determine the second valency.

2x+y=number of ccm. of $n/_2$ KOH used to determine the amount of all three valencies.

TABLE III.

Pure Cement Acids arranged according to their acid content.

Preparation	Amount of 1st and 2d Valencies	Amount of 1st Valency	Preparation	Amount of 1st and 2d Valencies	Amount of 1st Valency
Phenakit	12.0	0	Harvard Cement	14.9	1.2
Harvardid	14.2	3.7	Astral	21.3	5.6
A. K. Z.	14.5	2.8	Schoenbeck	25.0	8.3

Resumé of Tables II and III

Phenakit, Harvardid, A. K. Z., and Harvard cement contain about the same amount of freely valent acid.

Phenakit does not contain any free acid of the first valency, and is, therefore, the weakest acid. In spite of this, however, through hydrolysis, the hydroxyl in Phenakit can be made potent, and that this is so is proved by the result of further experiments.

Astral and Schoenbeck are almost equal in acidity, but considerably stronger than the rest. They also contain considerably more of the strong phosphoric acid of the first valency.

TABLE IV.*

Titration with $n/_{100}$ KOH immediately after mixing.

Preparation	Ccm. $n/_{100}$ KOH
Harvard Cement (1.64 Gr.)	93
A. K. Z. (1 Gr.)	102.5
Schoenbeck (1.13 Gr.)	104
Harvardid (1.05 Gr.)	124.4
Phenakit (1.06 Gr.)	141
Astral (1.13 Gr.)	242

TABLE V.

Titration with $n/_{100}$ KOH 20 minutes after mixing (kept in thermostadt at 35° C.)

Preparation	Ccm. $n/_{100}$ KOH
Harvard Cement (1.64 Gr.)	12
A. K. Z. (1 Gr.)	23.5
Harvardid (1.05 Gr.)	41.8
Astral (1.13 Gr.)	65
Phenakit (1.06 Gr.)	95
Schoenbeck (1.13 Gr.)	100

*Naturally with methyl orange as an indicator, a change of color occurred at once, since none of the cements now contain an hydroxyl of the first valency.

TABLE VI.

Titration with $n/_{100}$ KOH, 40 minutes after mixing (kept in thermostadt at 35° C.)

Preparation	Ccm. $n/_{100}$ KOH
Harvard Cement (1.64 Gr.)	11
A. K. Z. (1 Gr.)	11
Harvardid (1.05 Gr.)	40
Astral (1.13 Gr.)	50
Schoenbeck (1.13 Gr.)	80
Phenakit (1.06 Gr.)	94

TABLE VII.

Titration with $n/_{100}$ KOH, after being mixed for 40 minutes and then placed in thermostadt for 24 hrs. with water.

Preparation	Ccm. $n/_{100}$ KOH
A. K. Z. (1 Gr.)	6.9
Harvard Cement (1.64 Gr.)	10.8
Astral (1.13 Gr.)	26.9
Schoenbeck (1.13 Gr.)	29
Harvardid (1.05 Gr.)	39.9
Phenakit (1.06 Gr.)	46

For tables V, VI, VII—The mass was carefully powdered after the prescribed time, mixed with 150 ccm. of distilled water, filtered, and the filtrate titrated.

TABLE VIII.

Titrated after 40 minutes + that extracted from the water (kept for 48 hrs. in thermostadt in contact with water.)

Preparation	Ccm. $n/_{100}$ KOH
A. K. Z. (1 Gr.)	4
Harvard Cement (1.64 Gr.)	10.8
Astral (1.13 Gr.)	23
Schoenbeck (1.13 Gr.)	28
Harvardid (1.05 Gr.)	28.1
Phenakit (1.06 Gr.)	36.1

TABLE IX.

Titration of the water after mixing for 40 minutes and then placed in thermostadt for 48 hrs.

Preparation	Ccm. $n/_{100}$ KOH
A. K. Z. (1 Gr.)	0.08
Harvard Cement (1.64 Gr.)	0.8
Harvardid (1.05 Gr.)	3.4
Astral (1.13 Gr.)	3.9
Schoenbeck (1.13 Gr.)	4.2
Phenakit (1.06 Gr.)	11.3

For table VIII—The test masses were finely powdered after the specified time, mixed with 150 ccm. of distilled water, filtered, and the filtrate titrated.

TABLE X.

Amount of acid thrown off by the Cements during the first 48 hrs.

	A. K. Z. (1 Gr.)	Harvard Cement (1.64 Gr.)	Astral (1.13 Gr.)	Harvardid (1.06 Gr.)	Schoenbeck (1.13 Gr.)	Phenakit (1.06 Gr.)
	Ccm. $n/_{100}$					
Immediately after mixing	102.5	93	242	124.4	104	141
After 20 minutes	23.5	12	65	41.8	100	95
After 40 minutes	11	11	50	40	80	94
After 24 hours	6.9	10.8	28.9	39.9	29	46
After 48 hours	4	10.8	23	28.1	23	36.1

Resumé of Tables IV, V, VI, VII, VIII and X

Of interest to us is a discussion of the composition of the various cements when mixed, while hardening, or after hardening, since we do not introduce pure acids into a tooth cavity.

First, we see that after mixing none of the cements contain an acid of the first valency, and therefore according to my opponents are to be considered as analogous to salt water.

The amount of acid in these "salt solutions" immediately after mixing is as follows:

Harvard Cement, A. K. Z., Schoenbeck: little.

Harvardid, Phenakit: somewhat more.

Astral: quite considerable.

Twenty to forty minutes after mixing, or, in other words, after the filling of a cavity:

Harvard Cement, A. K. Z.: still very slightly acid.

Harvardid, Astral: slightly acid.

Phenakit, Schoenbeck: considering the time, still quite acid.

Twenty-four to forty-eight hours after mixing, or, in other words, after filling a cavity:

A. K. Z.: only a faint trace.

Harvard Cement: about the same as after 40 minutes—slightly acid.

Astral, Schoenbeck, Harvardid: still quite acid.

Phenakit: Poison! according to the views of our colleague Schreiber (Charlottenburg).

Amount of Acid Set Free:

(See Table X)

A. K. Z. binds the acid uniformly and rapidly, and almost completely.

Harvard Cement binds the acid rapidly, and to a great extent, leaving, however, a trace still free. (This finding is in accord with the results obtained by Prof. Miller.)

Astral, Harvardid, Schoenbeck bind the acid quite slowly, and leave a residual amount for quite some time.

Phenakit leaves considerable free acid for a long time.

Resume of Table IX.

This table considers the amount of acid lixiviated or extracted by water, which has been allowed to remain in contact with a cement for 40 minutes.

A. K. Z. shows practically not a trace of extracted acid.

Harvard Cement shows a small amount.

The rest, but especially Phenakit, show a considerable amount.

If, therefore, phosphoric acid itself is in the slightest degree dangerous, and really can penetrate to the pulp, then:

A. K. Z. is undoubtedly the least harmful.

Harvard Cement almost as harmless.

The rest are to be looked at with suspicion.

Phenakit, however, must be considered dangerous.

General Review.

The amounts of acid found, however, were so small that it seems questionable if it can penetrate even the thinnest layer of dentine, especially since it is very difficult for chemicals to pass through media of the consistency of dentine.

As Pringsheim has found, a chemical substance to penetrate a colloidal plate must first satisfy all the affinities of the material in each layer of the plate before it can penetrate further.

From the results tabulated in Table IX as a foundation, which, however, is not exactly permissible, we must judge that Phenakit has $\frac{1}{3}$ available acid and A. K. Z. only $^1/_{50}$; that is, for a medium sized cavity, if we need 0.14 gr. of A. K. Z., would mean that we have only to consider the amount of acid as $^1/_{350}$ of the amount computed; while with Phenakit such a cavity would represent $^1/_{21}$ of the tabulated quantity. So we see that in practice the various cements contain but traces of acid. These traces, however, are occasionally very quickly used up during conversion by the dentine salts. A further obstacle to the penetration of the acid, even if large amounts of cement are used, is caused by the plugging up of the dentine canals by the formation of salts.

Experiment.

How does the free acid penetrate the dentine to attack the pulp; how long does this take, and to what extent does the acid, if any, penetrate? To answer these questions, and stimulated by the experiments of Harlans and Szabós, who studied the action of silver nitrate on dentine, I employed ivory as the nearest in chemical composition to dentine among all the animal tissues. I used plates 0.3 mm. thick, impregnated with litmus.

Especially was I interested to determine how long it required for the acid to penetrate these plates. Now, since ivory is very porous and quickly absorbs water, the plates immediately curled up when floated on water, and I was compelled to allow the acid to penetrate the plates from above, as through a filter. I was very much surprised to find that even the strongest acids, such as sulphuric acid, nitric acid and hydrochloric acid required, under the most favorable circumstances, at least eight hours to penetrate these thin plates, while the various cement acids took from eight to ten hours for the same process. (Findings in accord with those of Pringsheim.)

The experiment was carried on in the following manner: The ivory was used in squares of 2 cm. each, whose edges were rimmed with wax.

The plates were placed on a bed of blue litmus paper constantly kept moist. In the center of a plate was placed a drop of the acid under consideration. All the acids showed, after a short time, an increase in its own volume, due to absorption of water, and many then showed the tendency to flow towards the edges. When the litmus paper support became reddened, it was an indication that the acid had penetrated. The ivory plates remained practically intact under the site of the acid drop, especially with the acid of Phenakit.

We must conclude that the acids effect the dentine in a cavity in a similar manner, and not like a chemical in a test tube, whose action can be altered by shaking and other conditions.

And yet, as before remarked, we do not employ a pure acid in a cavity, but a cement mixture in the form of an acid salt, whose acidity can be ascertained for each preparation by reference to the several tables.

It, therefore, became necessary for me to determine in what manner the cement acts on the dentine surface, and in what measure the free acid that still exists in the cement mixture can penetrate the dentine canals.

This second question I decided in the following way:

Two plates of ivory, each 2 mm. thick, containing a central perforation, are so arranged as to hold a thin (0.3 mm.) plate spanning the perforation. The whole apparatus was then fastened together.

In the upper small chamber was placed the cement under consideration, and in the lower chamber a wick of blue litmus paper. This ap-

paratus was immersed in a water chamber to the marked point, and the whole then placed in a thermostadt for 24 hours.

At the end of this time, I found the results corresponded with those tabulated in Table 9. This table is therefore the most important of all with regard to the question as to the extent to which the free phosphoric acid in tooth cements can affect the dentine.

The results showed that A. K. Z. and Harvard Cement (as prepared for a filling) have absolutely no action on ivory plates, as shown by the almost imperceptible reddening of the upper surface of the intervening disk. Harvardid caused reddening for about 0.01 mm., because of its phosphoric acid; Astral about 0.02 mm., Schoenbeck and Phenakit varied between 0.02 and 0.03 mm. in depth.

Pulp Irritation.

These results and the conclusions deduced from them are contained without doubt only in a correctly prepared cement.

But if a cement is prepared for a filling in too dilute a manner, then surely, because of the slow binding of the acid, sufficient remains free long enough to affect the dentine, percolate through the tubules, and affect the pulp.

Undoubtedly the pain that occurs in some deep cavities after filling is due to this improper preparation of the cement.

If the irritation is weak, then gradually the pain subsides and eventually disappears; possibly the pulp may have stimulated the replacement of the destroyed dentine cells. But if the action is a strong and protracted one, and especially if there is left but a thin wall of dentine between the filling and the pulp, then the pulp is too weak to overcome the action of the acid, and it dies.

So it is not to be wondered at that in deep cavities, in spite of a zinc phosphate cement foundation, or rather because of this, very often devitalization of the pulp is observed.

Hence, to-day we still believe in the advice of Miller who said that the bottom of all large cavities should first be covered with some indifferent substance, such as Fletcher's artificial dentine or gutta percha, and only after one of these is in place to complete the filling. Especially does this admonition apply if the cement contains too much water.

Under such circumstance, that is, in experiments so conducted that the chance of a mistake, especially through the improper mixing of the cement and consequent danger to the pulp is minimized, that even then other circumstances can play a rôle in the death of the pulp, and it is our duty, if not for scientific reasons at least as a working basis, to determine what these causes may be. Of possible factors there are so many that it is surprising how often the fault is placed at the door of the

cement preparation. That the pulp can die with any kind of cement filling is known to every practicing dentist.

I would only have to remind you of the animal experiments of Choquets, who found that bacteria remained alive in cavities for some time after the most careful fillings. He introduced bacteria into a previously thoroughly cleaned cavity, and filled it with hardened cement. Nine months later, on removing the filling, he found the previously healthy looking walls of the cavity discolored and softened.

So also Arkövy, in his book, "Diagnosis of Diseases of the Teeth," points to the possibility of an acute septic infection of the pulp, or the absolute destruction of the pulp, with their disagreeable consequences, as being caused by micro-organisms which had infected the apparently healthy dentine at the time of the filling. If we analyze the cases of pulp death in cement fillings, we find that the pulp dies in the majority of cases without causing symptoms, until one fine day, apparently without cause (referred to by Partsch), or may be through some extraneous circumstance such as a cold, or an unusual exertion which causes the blood to circulate more rapidly, or again because of some possible mechanical irritation, etc., suddenly a pericementitis is established, with severe pain, swelling and pus formation. On opening the tooth, either by trepanation or by removing the filling, a large amount of foul smelling pus is evacuated. This is about the usual picture, and it necessarily makes us agree to the possibility of an infectious character to the whole process.

In a beautifully written and very instructive article, "Concerning the Spontaneous Death of Pulp," Landgraf describes two classical cases that convinced him, that even the drilling necessary to clean out a tooth was often sufficient to cause the pulp under an old, apparently harmless filling to take on an inflammatory character.

Though it is true that death of pulp is more frequently seen with cement fillings than with cavities filled with other materials, yet we must not to forget that by far the majority of fillings are of cement, and also that cement fillings are usually done more carelessly than when working with other materials.

Apffelstädt concludes that poor excavation of a cavity or improper disinfection of a soft shell covering the pulp is the usual cause for inflammation and secondary necrosis of the pulp, but I must add to these, especially those cases where pulp death most frequently occurs, that is, in young anæmic people, where an exposed pulp horn may be overlooked because of the anæmia, and because of insufficient examination of the walls of the cavity with an explorer.

How often does it occur that teeth are filled in which the pulp had previously been diseased, but through its power of resistance had resisted

abscess formation, and protected itself by the formation of scar tissue, or had formed a pyogenic membrane which encapsulated a small pocket of pus? While cleaning a cavity, because of the absence of pain this condition is overlooked, and after a period of time, exacerbates under the filling, or because of the presence of the filling the pus may be pressed into the otherwise healthy pulp tissue, which promptly becomes infected and forms an abscess. In short, there are so many possibilities that it is hardly necessary to warn you against always blaming the material used as causing the damage.

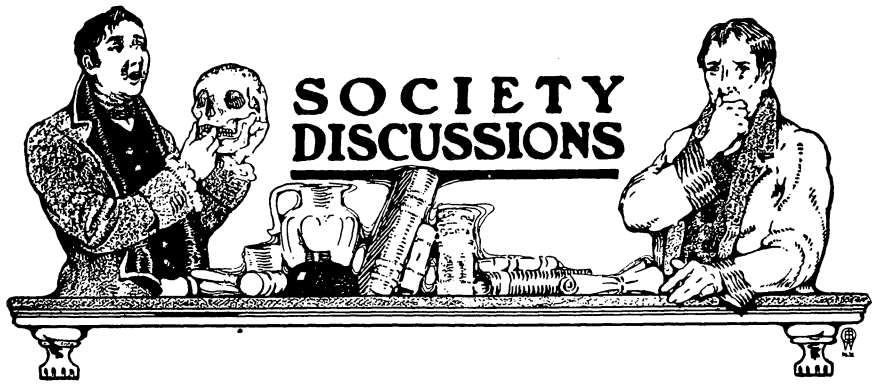
In conclusion, allow me briefly to outline a theory I have, and which I have never heard of being offered before, concerning this subject.

All cements show on their exposed surface a tendency to protrude in a rounded shape, as soon as they are placed in the cavity.

We know that many cements harden spontaneously. So it can happen, especially in those cases where there exists but a thin layer of dentine over the pulp or pulp horn, that the cement following the path of least resistance when being pressed into the cavity, presses the thin pulp wall inwards, or even breaks through it, and in this condition hardens, in the first instance causing the pulp cavity to be permanently decreased in size, while in the latter case causing an injury to the pulp itself.

For myself, I must say that I have seen a great many patients who consult me because a tooth, which had been filled some time previously, had become continually painful. By carefully boring out the filling, I would find in the majority of cases a brownish-red spot, about the size of the head of a pin, on the bottom of the cavity, which signified a previous hemorrhage. Should I not consider all of these cases as due to an exposed pulp which had been overlooked at the time of filling, there remains then only the explanation I have offered.

I have reached the end of my paper. I feel compelled, however, before concluding, to express my gratitude to those authors who have written papers during the last two years concerning the chemistry of the various cements. Though they have shown that they have not received a methodical teaching in the chemistry of cements, and in consequence have made serious chemical errors, still I have obtained from their work the inspiration to attempt these experiments, and in consequence of the results obtained have increased my store of knowledge.



Second District Dental Society—November Meeting, 1910.

A regular meeting of the Second District Dental Society, of the State of New York, was held on Monday evening, November 14, 1910, at the Kings County Medical Library Building, No. 1313 Bedford Avenue, Brooklyn, N. Y.

The President, Dr. Ottolengui, occupied the chair, and called the meeting to order.

The Secretary read the minutes of the previous meeting, which, on motion, were approved.

Dr. Houghton presented to the Society some old and valuable volumes of dental literature. A hearty vote of thanks was offered to Dr. Houghton.

Dr. Hillyer moved that a congratulatory cablegram be sent to our distinguished confrere, Dr. N. S. Jenkins, at the dinner to be tendered to him in honor of his seventieth birthday, at Paris, France. The motion was carried.

Dr. Clarence J. Grieves, of Baltimore, then read the paper of the evening, entitled: "Systemic Pus Poisoning Associated with Diseased Apical Regions." The paper was illustrated by lantern slides.

Dr. Grieves. I want first to express my appreciation of the honor I feel in appearing before this Society. I have been the star—or thought I was—on one or two occasions, but I never before had to put out the sign, "Standing Room Only." (Laughter.)

I hope you will realize some little benefit from this. It is a report of the work of three years. I have done the dental end of it. The medical end of it proper has been done by the men at the Johns Hopkins Hospital.

I want to emphasize the old-fashioned rule of "Clean up" in this paper. I mean that in a bacteriological sense.

Discussion of Paper by Dr. Grieves.

Dr. H. C. Ferris. I think we have listened to a paper that marks an advance in scientific dentistry. There are many points which Dr. Grieves has presented of a scientific character, which would require considerable thought before any definite statement could be made. He leaves us a message—a practical one—we must not crown living teeth with shell crowns, and if we devitalize, we are liable to meet the conditions described; therefore, he leaves us in a rather difficult position; but that is for our skill to master, and I believe we may not be afraid to continue our most careful efforts as we have been endeavoring to do in the past.

The systemic condition of osteomyelitis, I believe to be of great interest to us. I have had a number of cases which I had not attributed to this condition at all, but I am convinced, after listening to the doctor's paper to-night, that they could be directly attributed to this cause, and I, for one, am very grateful to the doctor for his scientific presentation.

Dr. L. C. Leroy. We have listened to an extremely interesting paper, and I would like to thank the doctor, as well as the Second District Dental Society, for the privilege of being here and listening to it. I might contribute a little to the subject by reviewing a case that came under my observation—where I was called in to see a patient who had been suffering from mastoiditis. Seven years ago that gentleman called on me for general dental treatment. I noticed in particular a lower second molar which had been crowned. It was quite loose and discharging much pus, and was giving some trouble. Thinking to ameliorate the condition, the crown was removed. The pulp canals could not be reopened—they had been previously treated—so were refilled with eucalypto-percha. After the pyorrhetic treatment, the condition not improving, I advised the extraction of the tooth, which he did not care to have done. He is an extremely nervous individual, a sufferer from diabetes. I was not then so sure, as I have become since, that diabetic and other organic disturbances are influenced by oral septic conditions. I did not hear from him again for a year. He came back then, and has been in many times since, but each time refused to have that molar extracted. His health was not improved in regard to the diabetic condition. During last summer, while in bathing, he was struck on the head by a wave, which caused aural trouble, and was followed some time afterwards by this mastoiditis, which was operated upon this fall.

The tooth that I have been describing became periosteally painful, and the patient now wanted it removed. When I was called in and told the history of the mastoiditis, I felt the trouble was attributable to the retention of that tooth. The physician in charge had not regarded it as a factor. He gave permission for its extraction, because of the discomfort the patient was suffering. Prior to this time the mastoid wound did not heal well, but after extraction of the tooth and treatment of the socket, it healed rapidly. I am convinced that many cases of infection have dental origin, and that conviction has been confirmed after listening to the doctor's paper this evening. Many cases we see of similar infectious character, I have not the slightest doubt, could be traced to dental origin. The paper is of such a broad, scientific character, that I am not able to treat it as I should like—not being a bacteriologist—but beyond a doubt where there is slight infection or slight discharges of pus about the mouth, such discharges should be eradicated entirely; whether this involved a foreign substance, such as calculus or pulp canal contents or necrosed bone or tooth, or the whole area of infection.

Ever since devoting myself to the study and care of pyorrhea, I have found that vast areas of infection exist, and great opportunities for septicemia are possible—conditions that I never dreamed of before—pouring their virus into the alimentary canal. Very few general practitioners, and even fewer medical men, recognize the gravity of allowing such constant infiltration. It is the cause of much of the auto-intoxication we hear so much about.

Dr. Grieves is entirely right in all of his deductions, except the too liberal extraction of teeth. They are such important organs in the human economy that I believe every one of them should be given a chance where it is possible to do so.

The doctor's paper is an immense stride in the right direction.

Dr. Nodine. Can there be any explanation given of why, after some of those roots were amputated, or the apical portions were amputated, the conditions did not clear up?

Again, if the roots were filled properly, and the necrotic portion eradicated, did the trouble clear up?

Dr. Nies. I have been deeply interested in this splendid paper. It was helpful, it was excellent; but as I looked at the radiographs, and saw some of the teeth that had been extracted, I felt I would not have done that had I been in charge. It seems to me every one of those cases could have been cured by a proper opening and proper curetting of the apical space. We do not go at that operation radically enough. We do not cut freely or deeply

enough. I have noticed a number of operations of that kind done by men who were performing apicoectomy—the cutting off of root ends—which operation I consider radically wrong. I consider cutting off of the end of a root wrong. The apical space is affected—not the end of the root—and if you clean that out thoroughly, getting out every portion of necrotic bone, that root end will not need excision. The good that is accomplished during that operation of root cutting is largely due to the bur cleaning out the necrotic alveolus, and not to the cutting off of the end of the root.

As I look at those cases, I think they could have been cured by free cutting. In work of that kind, I use cocaine and adrenalin, and I do not hesitate to open freely, and go in with a large bur and clean out everything that even feels soft.

Dr. Chayes. I think it high time that the one fact that it is fallacious to allow a pulp to remain alive under any gold crown, whether a shell or a cast crown, should have been supported by radiographs. I have seen misery in the wake of gold crowns, and woe in the wake of them after they had been removed, and there is nothing that would make me hesitate to remove the pulp of any tooth I was going to crown, even if that tooth had not a blemish on any one of its walls.

I must disagree with Dr. Nies when he says that it is not necessary to amputate the end of the root. Dr. Nies forgets that it is the root primarily that has become infected at its apical end, and once roughened and necrotic, no matter how thoroughly the space about it is cleared out, you yet leave a cause for the trouble to recur, and it will recur.

There is very little to say about a paper like the one Dr. Grieves gave us to-day, because there is nothing to do but commend it, and I hope it will be the forerunner of many radiographic evidences of the fact that no matter whether your crown be just an ordinary crown or a cast crown—no matter what method you pursue, you must remove so much of the walls of the tooth to put upon it a crown that fits absolutely beyond the shadow of a reasonable doubt—that you have not any right to subject your patient to that torture which comes upon contact between the exposed and sensitive dentine with the glacial phosphoric acid of your cement. That is where the initial trouble is: when that acid comes in contact with the exposed dentinal tubules, an irritation is brought to the pulp. That pulp then becoming irritated, and becoming more irritated as time goes on, that pulp will inevitably die or become hypertrophied; and if, at times, you find cases that do not give you any visual trouble, the radiographs of Dr. Grieves are evidence that the trouble may be there, whether you see it or not.

Dr. Rhein. I preferred not to speak at the outset of th discussion, hoping to be able to reply to some dis cussion that might be in opposition to that of the essayist. It is a great surprise at a meeting as large as this, not to have heard any discussion antagonistic of the advocacy of pulp removal. I scarcely feel that it is possible that so soon a body of men so large as this should have suddenly become entirely converted to the views of the essayist. I wish I could believe this to be the case, and it is with sincer regret that I rise to speak without having heard the remarks of many those who are present, whom I believe are not in accord with these view

I would like particularly to call your attention to the startling pr sentment made by the essayist. Stop for a moment and think what means, if this presentment is true! Think of the number of cases in yo own practice in which there must be distinctive evidence of pus infecti if the report that we have listened to to-night is a fact! If it is a fa and I believe it is, to a very large degree, then we have reached the ti when the understood practice of our profession must be modified to very great degree. This is the point to which I wish to call your atte tion. I am firmly convinced that the presentment of the essayist is ab correct; but I also feel that not only are the majority of our own s cialty ignorant of this fact, but the ignorance is much greater among general practitioners of medicine. The woeful ignorance of the ge practitioner, in regard to pathological conditions of the mouth, mal very difficult for us to demonstrate to him, at critical periods, th portant pathological rôle which these conditions play at times w life of the patient is being sapped to the greatest extent.

While I agree with the presentment of Professor Grieves a very large extent, take the position that Dr. Nies took—t these teeth could have been preserved; but I differ both with conclusions of Dr. Nies and those of Dr. Chayes in regard to the therapy of these cases. I believe each lost sight of the fact that the pathological conditions vary—they are not always the same. Dr. Nies's conclusion is correct sometimes, and Dr. Chayes is correct sometimes, and it is important that a clear and true diagnosis of the pathologic state should be made before the operator determines what shall be done to cure these apical abscesses that do not show any apparent pathologic symptoms externally; and it is in this respect that the radiograph is of the greatest value, because the radiograph, while it is not always a true index of many of the conditions we would like to know about—on account of optical reasons unnecessary to enter into at this moment—still it does differentiate with the clearest distinctness as to what portion of the tissue is diseased.

In very few of those cases—and here I agree with Dr. Nies—is the ementum or any portion of the root itself involved; but where the root involved, the radiograph shows it as plainly as a photograph would—ad here I totally differ from the treatment indicated by Dr. Nies. I also ffer entirely with his treatment in the large majority of cases. I have iled to cure any of those cases by the treatment advocated by Dr. Nies. have failed to find curettage of any benefit in the cure of these cases, ust as the essayist fails to get good results.

It is with a realization of one's smallness that I stand here to-night, cause it is about thirteen years since I published in the ITEMS OF INTEREST a method of curing these cases. I say "curing," and I say it ivisedly—I mean radically curing such conditions as the essayist has ntioned to-night, and I have plenty of radiographs that demonstrate completeness of curing such cases where the necrotic area has not ched any of the osseous tissue, as it fails to do in the large majority cases. I do this by electrolysis, not by making any opening from hout, into these minute abscesses; but through the canals of the root these blind abscesses, destroying them thoroughly, and by means of electrolysis making it impossible for any bacterial forms to exist.

I do not believe anyone who has given this treatment the careful ntion it merits can fail to endorse the strong position I take in regard s value. It does seem rather humiliating that the treatment which simple, and which is so important, as the essayist has brought to ttention to-night, should receive such slight adoption, although it n called to the attention of the profession so frequently.

e other classes of cases, I do not believe anything short of the or the removal of every part of the necrotic area—and that mean g beyond the line of infection to some extent—will produce a cure, but such an operation thoroughly performed, under proper aseptic conditions and proper aseptic treatment, subsequent to the operation, is bound to meet with perfect success, unless there is something extraordinarily unusual in the case. It is on that account that I feel that we should not take the view that the essayist does—of the necessity of having recourse to prosthetic dentistry for the salvation of teeth that require either crowning or the removal of pulps, although they both should go together.

I can conceive of very few cases requiring pulp removal where it is impossible to remove every particle of the pulp contents of the canal, however tortuous it may be, and I believe it is impossible to show a case of this kind where such an operation has been properly performed. Here is where the radiograph is not reliable. It is impossible for optical reasons to take a radiograph, however clear or perfect it may be, and be

assured from it that every particle of organic tissue in the pulp canals of that tooth has been removed; and you must remember that it takes but an infinitesimal portion of pulp tissue to become a most fruitful focus of infection.

That brings us to the conclusion of the essayist's remarks—the etiology. The etiology of these cases is very simple. It is divided into two classes of cases—one, most common, where the infection always proceeds from infected pulp tissue of some kind—say infected organic tissue in the pulp canals. The other class of cases is a rare type known as the pericemental abscess, where we find the pulp living. This is not an unknown quantity by any means, especially in the class of cases cited by the essayist. The rheumatic arthritic type of cases is very prone to have minute tophi deposited around the apices of the roots, which are very liable to become the foci for infection if the vitality of the patient has been lowered to a certain extent.

I have a magnificent radiograph of such a case that I had in conjunction at one time with your President, where, to our astonishment, we found a living pulp. The fact remains that to us, as dentists, there is one practical lesson in this whole matter, and that is, that if pulpless teeth are to be conserved, it means that every minute particle of organic tissue must be removed. This means that the operator must give the necessary time to this operation, and that means that it is necessary to obtain a fee for such an operation commensurate with the time.

Poor Canal Treatment Due to Poor Fees.

We discussed this subject before the Ohio State Society last December, and I find if we probe this matter to the bottom—while it is an unpleasant topic to bring before a professional society, it is the true key to the situation—the difficulty of the average professional man to make a decent livelihood. He should be able to receive a compensation commensurate with the time that it is imperative to take, if the pulps of teeth are properly removed. I do not believe there is a man or woman within the sound of my voice who is not able or who cannot become as able to remove a pulp as thoroughly as I can to-day, if willing to take the time to do this character of work; but unfortunately, most of us have either not the courage to ask pay for so much time required, or else feel the impossibility of ever being able to receive that compensation.

I throw this point into your midst, because it is the only practical point in conjunction with this subject that stares the whole profession of dentistry straight in the face. There is not a man who is honest, who is willing to deny the necessity of taking this time for this operation;

and yet he dares not take it in his office, because he feels that if he did, he and his family would starve.

This is the question that meets us, if we intend to save the teeth of our patients, and save them we can, if we can find a way to be paid for the time. There is a way, and it is a question when the profession is willing to wake up to realize it is their duty to educate the people to the fact that an operation of this kind is as necessary to their welfare, to their health, to life itself, as an operation for appendicitis when that becomes necessary—absolutely so. When the dentists awaken to that point and educate their patients to that point, the time will have arrived when they will be able to do the work they want to do at heart, but are unable to do, because they cannot get paid for it.

This is what I want to give—not only to the Second District Society, but to every dentist that reads the ITEMS OF INTEREST, because I feel that it is the lesson of the hour. It is the one thing that will raise our specialty to the position that it really should occupy. As long as you fail to reach this position, you are bound to come back to the conclusion of the essayist, that the teeth you are saving now by the thousand should be extracted, and it is up to the profession itself to take its choice as to what its future shall be in this respect.

Dr. Grieves. My remarks will be very brief. I appreciate all Dr. Rhein said, although I differ with him materially. I will take up the matter in regard to treatment now. I was asked why the cases did not clear up? There was not a dissenting voice as to these cases occurring—you apparently agree with me—and only the question of treatment remains. These people were all arthritics. They all came from the orthopedist. They happened to be some of my root canals. They all had joint symptoms—arthritic symptoms—and I take it that this is a condition that occurs in arthritics. All of the men who discussed the paper evidently missed that point, or I did not make it clear.

Dr. Rhein. I differentiated between those two classes—the arthritic and the much more common class, which is not arthritic.

Dr. Grieves. In every one of those cases, except the two that got away from me and had their teeth extracted, I conscientiously curetted where I could find points to curette. The patients were in bad shape physically. I had a medical man with me. They did not get well, however, they got worse. If you are going to ablate the roots—and here we reach Dr. Nies's point, and I cannot agree with him, because the only case I did not succeed in was an ablation. I have looked it over, and it is distinctly necrotic. I have

cured many other cases, particularly with Schamberg's operation, which I think highly of. All such treatment made the conditions worse. If you curette, and pack, and drain, and your tissue gets larger—your sinus gets larger—your fissure gets larger, and your patient's temperature goes on, and finally you extract that tooth. If you do not believe it, gentlemen, treat such a case.

Dr. Rhein. In discussing this paper, Dr. Grieves, I did not suppose you limited your cases to arthritic cases. I supposed you were discussing the general subject of blind abscesses that had no distinction, because it means a much more limited number of cases than I had under consideration. In my discussion, I divided the condition into two classes—those you now speak of, and the other much larger class, due to pulp infection. The etiology of the class you speak of is unquestionably due to the arthritic condition, as I mentioned, and I want to say right here, I do not differ very greatly with the essayist in this respect, because a large percentage of the cases that he is speaking about are undoubtedly incurable—there is no question about it; but the number of those cases is such a small percentage of the cases in general, that it makes but a very small item in the practice of an average dentist. The number of cases Dr. Grieves has been able to get hold of in a comparatively short time is due entirely to his connection with the orthopedic department in a large hospital. It is something that would be entirely different in a private practice. I think it is no more than correct that this distinction should be made very clear, and I think most of the speakers to-night had in mind the large number of what is generally known as small, blind abscesses, of which we have no knowledge until we see them reproduced in the radiograph.

President Ottolengui. Were those arthritic cases that you spoke of as having been cured, in your practice?

Dr. Rhein. I believe I have cured some of those cases, but I think the large number of cases that have reached the condition the essayist speaks of are absolutely incurable without extraction. I do not suppose that it was the object of the essayist to limit his paper entirely to this particular character of case, and I really hope that was not his intention, because the pathologic condition is there just the same in so much larger percentage of cases where we do not have this arthritic factor to contend with.

Dr. Grieves. I took it for granted that those foci would be self-evident. These cases were reported from the orthopedic standpoint, and this report was practically made to the Society of Orthopedists that met in Washington last spring. Dr. Michael Hoke, of Atlanta, was able to show some cases along that line. I took it for granted that people recognize what happens when pus foci occur usually. I am making this report along orthopedic lines.

Dr. Voelker moved a hearty vote of thanks to the essayist, which was unanimously carried.

Adjournment.

EDITORIAL

Shall the Dental Profession Become a Trade Union?

Elsewhere in this issue we publish, by request, a circular letter to the dental profession, in which the dentists of this country are invited to "organize." Just what this "organization" is to be is not made very clear, but a careful reading leaves the impression that the dentists are asked to form a sort of trade union.

The Standard Dictionary tells us that a trade union is "An organized association of workmen skilled in any trade or industrial occupation, formed for the protection and promotion of their common interests, and especially to secure remunerative wages for their labor."

The circular letter says: "The undersigned, therefore, invite every reader of this to join in a thorough canvass of the whole profession, and enlist as members of a new organization every one whose personal interest and loyalty to the profession keeps alive his sense of justice and fraternity."

This is a bit obscure, but nevertheless the language used brings the proposed organization fairly within the dictionary definition of a "trade union."

A study of the other parts of the circular letter discloses that the prime purpose of this dental trade union is to wage a patent war with Dr. Taggart. Is not this a rather unworthy cause, and are not the signers just a little bit inconsistent? Have we not been told, ofttimes and o'er, that the profession has no objection to Dr. Taggart's having a patent on his machine, or any other article of manufacture, but that it is his process patent that is so obnoxious? And is it not announced in this very circular that the Defense Committee in the Taggart-Boynton suit have done their work so well "that there is every reason to believe that the original Taggart patent will soon be decided in favor of the profession?"

If this statement is not true, it should not be made, and if it be true that the signers of this circular letter really think that the suit on the process patent will be decided against Taggart, why this attempt at organization of a dental trade union, and why should dentists contribute more money to a cause so confidently declared to be already won?

An excuse given is in the following words: "But Dr. Taggart's attorney has recently announced the probable institution of suits against many dentists under the claims of new patents, etc., etc."

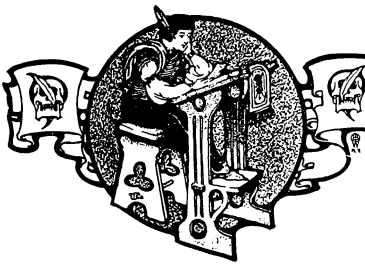
Now, let the dear reader, who has been so cordially invited to put up his money and join this trade union, pause and ask himself a question or two. What other patents can Taggart have? Surely he cannot have another process patent on the same process, which would have any value if the Defense Committee has already defeated the original process patent.

If not process patents, these other patents of Taggart's must logically be patents on machines or parts of machines, or at least upon articles of manufacture. And it has been repeatedly declared that the profession has no objection to such patents. Are we to understand then that this proposed dental trade union intends to fight all of Taggart's other patents, in addition to the process patent, which is already beaten? Is that a "sense of justice and fraternity," according to the code of the signers of this remarkable circular letter?

There are some who think, some who conscientiously think, that it is not ethical for a professional man to take and hold any sort of patent. Nevertheless, these same high-minded gentlemen have cheerfully fraternized with many professional patentees, and we may consistently ask

them this question: "Even if it can be shown to be unethical for a professional man to take and hold a patent, is it ethical for a professional man to unlawfully infringe upon patent rights merely because the patentee happens to be a dentist? Is it because of a "high sense of justice and fraternity," that the dental profession cheerfully pays the added cost of all articles patented by laymen, but resists tribute of the same sort to his erstwhile professional brother?

Has not the time arrived for the dental profession to really inform itself as to the facts in this Taggart muddle? Have they not long enough contributed blindly to "defense funds"? Before paying out any more money for lawsuits, would it not be as well to wait and see if it be true that the Defense Committee has defeated Taggart in the case involving the process patent? Secondly, would it not be as well to send down to the Patent Office and get copies of all the Taggart patents, and study them before banding together blindly to participate in lawsuits that may never occur?



CORRESPONDENCE

A Permanent Defensive Organization is Necessary to Ascertain and Safeguard the Common Rights of the Dental Profession.

The Dental Protective Association was formed and collected funds for the purpose of testing the validity of dental patents, but has recently so changed its by-laws and strayed from its original purpose as to become the ally and collecting agency of a patentee, whose test suit against the profession has been prolonged over the last three years; the patentee in the meantime securing two new patents to strengthen the claims of the original.

It was the patentee's own choice to apply the rigor of the law rather than an amicable and businesslike proposition to the profession. A defense committee was therefore organized, and its work so successfully performed that there is every reason to believe the original Taggart patent will soon be decided in favor of the profession. But Dr. Taggart's attorney has recently announced the probable institution of suits against many dentists under the claims of the new patents, whose validity each individual sued would have to bear the expense of testing in the courts unless we create a dependable permanent defensive organization.

The object of such organization should be safeguarded by proper limitations on the policy and powers of its managing officers. For instance, there should be no such concentration of authority as Dr. Crouse exercises in the voting of all proxies not otherwise assigned, whereby he was enabled to change the policy and the law of the Dental Protective Association without the knowledge of the membership or an opportunity for their enforcing a protest. Neither should there be such authority to any three men as is granted to the Board of Directors of the Dental Protective Association, whereby the board can change the law and policy of the organization on a week's notice to itself. Neither should any three men have such extraordinary power as was exercised by the Board of Directors of the Dental Protective Association, whereby there was adopted an agreement previously arranged between Dr. Crouse and Dr. Taggart, providing that *"No member of the Association is to defend or join in or*

contribute to the defense of any suit upon any of said patents while practicing the method under such permission from Dr. Taggart."

By this partnership agreement the Dental Protective Association acquires 40 per cent., and Dr. Taggart 60 per cent., of the money collected through this agency. Many consider this alliance more dangerous to the independence and safety of the profession than was the patent situation which threatened to enslave the profession but a few years ago. To say the least, it would be unwise, unsafe, inexcusable and insanely foolish for us to rest in idle indifference, while organized effort, backed by capital, seeks to tie the hands of one after another of us until the profession loses its virility, its independence, and its community of interest.

We, as a profession, have had the benefit of the course pursued for three years by the Defense Committee in the Taggart-Boynton suit, and a permanent defensive organization may utilize the information, the experience and the data accumulated, and this defense committee, of which Dr. M. F. Finley, of Washington, D. C., is chairman, and its contributing supporters, will be utilized as a nucleus of value in every respect. It seems to us the part of wisdom and sane self-protection to organize, and that ordinary prudence demands, and the vast interests of the profession require, the most prompt canvassing and quick response possible.

The undersigned, therefore, invite every reader of this to join in a thorough canvass of the whole profession, and enlist as members of a new permanent organization every one whose personal interest and loyalty to the profession keeps alive his sense of justice and fraternity.

In this crisis let not the stigma of injustice or of disloyalty rest upon any member of the profession.

M. F. Finley	E. P. Dameron	A. J. Cottrell
R. Summa	H. L. Wheeler	C. W. Rodgers
W. E. Boardman	F. W. Stiff	C. S. Butler
Wms. Donnally	E. E. Haverstick	H. C. Pelton
W. H. Trueman	F. A. Roe	S. H. Voyles
Wm. Carr	F. T. Breene	Geo. H. Wilson
V. E. Turner	I. A. Bass	H. L. Roberts
R. H. Volland	W. G. Crandall	

Response should be addressed to

DR. M. F. FINLEY,
1926 "Eye" St., N. W.,
Washington, D. C.

Dentists in the Army.

Editor THE ITEMS OF INTEREST:

SIR.—For the general information of the dental profession, and those young gentlemen who have been deterred from seeking service in the United States Army Dental Corps, by reason of what has been, in many respects, an undesirable status, I have the honor to state that on March 3d a measure entitled "A bill to improve the status and efficiency of the dental surgeons in the United States Army," was passed by the Congress and approved by the President of the United States. (H. R. 23097, incorporated in H. R. 31237, with slight changes.)

It has long been recognized by the Surgeon-General of the Army and the War Department that the Dental Corps is a valuable addition to the Medical Department of the Army, and that the status of the dental surgeons, as authorized by the provisions of the previous law, were inadequate and insufficient to properly reward them for their services or to further tempt young practitioners of the highest professional ability to enter the service.

The passage of the measure referred to has greatly improved the status, pay and allowances of the Corps, and should make the service desirable and attractive to such young and unmarried dental practitioners who think they would enjoy a military life.

Section 2 of the bill provides "That all original appointments (those made since the above date) to the Dental Corps shall be *acting dental surgeons,* who shall have the same official status, pay and allowances as the contract dental surgeons now authorized by law."

Section 3 of the measure provides that "Acting dental surgeons who have served three years in a manner satisfactory to the Secretary of War, shall be eligible for appointments as *dental surgeons,* and, after passing in a satisfactory manner an examination which may be prescribed by the Secretary of War, may be commissioned with the rank of first lieutenant in the Dental Corps to fill the vacancies existing therein."

Section 4 provides further, "That the pay and allowances of dental surgeons shall be those of first lieutenants, including the right to retirement on account of age or disability, as in the case of other officers; *Provided,* That the time served as dental surgeons, as acting dental surgeons, or contract dental surgeons, shall be reckoned in computing the increased service pay of such as are commissioned under this Act." This clause provides for advancement or promotion, practically, of one grade, with commissioned rank in the regular service of first lieutenant, with an increase of pay from ($1,800) one thousand eight hundred dollars to ($2,000) two thousand dollars per year. Quarters when available, or in

lieu thereof when no quarters are furnished, commutation at the rate of ($36.00) thirty-six dollars per month. Longevity pay—which is a ten per cent. increase on regular pay every five years—for twenty years. Foreign service pay—which is ten per cent. increase on full pay for services in the Philippines or Alaska—and retirement on three-fourths pay for age or disability contracted in the service and in line of duty.

Section 5 provides "That the appointees as *acting dental surgeons* must be citizens of the United States, between twenty-one and twenty-seven years of age, graduates of standard dental colleges, of good moral character and good professional education, and they shall be required to pass the usual physical examination required for appointment in the Medical Corps, and a professional examination which shall include tests of skill in practical dentistry and of proficiency in the usual subjects of a standard dental college course."

Examinations are now being conducted with the view of filling the Corps to its maximum strength. Dentists therefore desiring to take the examinations should make application at once to the Adjutant-General, U. S. Army, War Department, Washington, D. C., when a blank application sheet will be forwarded to them to be executed and returned.

The character of the physical examination is the same as that required for surgeons entering the Medical Corps.

The professional examination comprehends all subjects taught in standard dental colleges in both theory and practice, and are made as thorough as is fair to the applicant and consistent with the best interests of the service.

The Army Dental Surgeon, if he is to fill his position with credit to himself and his profession, and with proper efficiency to the service, must be well educated, above the ordinary in technical ability, and well qualified in all departments of dentistry. The need of these requirements will be more readily appreciated when the statement is made, that the dental surgeons of the army are very rarely associated at a post with a member of their own profession. Consequently, they are thrown entirely upon their own professional resources, and must exercise their own judgment in the treatment of their more difficult and serious cases, as consultations are practically out of the question.

Furthermore, the surgeon of the post frequently refers cases, involving diseases of the mouth and jaws with which he is more or less unfamiliar, to the dental surgeon, and expects to find, as he has a right to, that the dental surgeon is not only capable of rendering a correct diagnosis, but competent to take charge of the case if required to do so; as in the treatment of fractures of the jaws, deep-seated abscesses of the

jaws, associated with impacted teeth, facial neuralgia, empyemia of the maxillary sinus, etc., etc.

The Deans of the Dental Colleges and the profession generally can greatly assist the department in building up and improving the efficiency of the Dental Corps, by advising and recommending young practitioners of the best attainments to apply for these positions.

The position of a dental surgeon in the United States Army is an honorable one, and should prove attractive to young men, as the pay and allowances now offered are good, and in the unfortunate event of broken health incident to the service, or upon reaching the age limit of sixty-four years, he retires from the service with three-fourths pay, which, after twenty years or more of service, would give him a yearly income of ($2,160) two thousand one hundred and sixty dollars.

Very respectfully,

GEORGE H. TORNEY,
Surgeon-General U. S. Army.

Something About the Haskell Fund.

DEAR DOCTOR.—Everyone in the dental profession knows Dr. L. P. Haskell, but everyone does not know that he has written a book. Dr. Haskell has devoted sixty-five years of his life to one department of prosthetic dentistry—artificial dentures. He has written the essence of his experience in this volume, and it is now for sale by a committee selected by Dr. Haskell to represent him. He does this because he has more taste for the art of dentistry than he has for business. In fact, he has so little taste for business that he has lived to the age of eighty-five without thinking much about it. No man ought to be compelled to work after he is eighty-five, and so Dr. Haskell's friends have decided that this book should be made to support him comfortably for the rest of his days. It is a small volume of sixty-three pages, and the price is $2. There is a splendid portrait of Dr. Haskell in the frontispiece, and this itself is worth the price of the book to the many friends in the profession who know and love him.

Fraternally yours,

Committee { DR. C. N. JOHNSON, Chairman, 31 Washington St., Chicago, Ill.; DR. T. W. BROPHY; DR. J. A. BULLARD.

For sale by C. L. France Dental Co., Chicago.

SOCIETY ANNOUNCEMENTS

National Society Meetings.

NATIONAL DENTAL ASSOCIATION, Cleveland, Ohio, July 25th to 28th, 1911. Secretary, Dr. H. C. Brown, 185 E. State St., Columbus, O.

AMERICAN SOCIETY OF ORTHODONTISTS, September 20, 21, 22, 23, 1911, Boston, Mass. Secretary, Dr. F. C. Kemple, 576 Fifth Avenue, New York.

State Society Meetings.

ALABAMA DENTAL ASSOCIATION, Montgomery, Ala., June 6, 1911.
Secretary, Dr. E. W. Patten, Selma, Ala.

ARKANSAS STATE DENTAL ASSOCIATION, Pine Bluff, Ark., about June 1st.
Secretary, Dr. I. M. Sternberg, Fort Smith, Ark.

CALIFORNIA STATE DENTAL ASSOCIATION, San Francisco, Cal., June 14, 15, 16, 17, 1911.
Secretary, Dr. C. E. Post, 126 Stockton St., San Francisco, Cal.

COLORADO STATE DENTAL ASSOCIATION, Boulder, Colo., June 29, 30, July 1, 1911.
Secretary, Dr. Chas. A. Monroe, Willard Block, Boulder, Colo.

DELAWARE STATE DENTAL SOCIETY.
Secretary, Dr. Warren Combs, 410 Delaware Ave., Wilmington, Del.

FLORIDA STATE DENTAL SOCIETY, Pensacola, Fla., June 20, 21, 22.
Secretary, Dr. W. A. Dean, Tampa, Fla.

GEORGIA DENTAL SOCIETY, Macon, Ga., June 8, 1911.
Secretary, Dr. DeLos H. Hill, Grant Bldg., Atlanta, Ga.

ILLINOIS STATE DENTAL SOCIETY, Peoria, Ill., May 9, 10, 11, 12, 1911.
Secretary, Dr. J. F. F. Waltz, Decatur, Ill.

INDIANA STATE DENTAL ASS'N, Indianapolis, Ind., May 16, 17, 18, 1911.
Secretary, Dr. Otto U. King, Huntington, Ind.

IOWA STATE DENTAL SOCIETY, Des Moines, May 2, 3, 4, 1911.
Secretary, Dr. W. G. Crandall, Spencer, Ia.

KENTUCKY STATE DENTAL ASSOCIATION, Owensboro, Ky., May 23, 24, 25, 1911.
Secretary, Dr. W. M. Randall, Louisville, Ky.

MAINE DENTAL SOCIETY, Fabyan, N. H., June 27, 28, 29, 30, 1911.
Secretary, Dr. I. E. Pendleton, Lewiston, Me.

MARYLAND STATE DENTAL ASSOCIATION.
Secretary, Dr. F. F. Drew, 701 N. Howard St., Baltimore, Md.

MASSACHUSETTS DENTAL SOCIETY.
Secretary, Dr. C. W. Rogers, 165 Howard St., Dorchester, Mass.

MICHIGAN STATE DENTAL SOCIETY.
Secretary, Dr. Marcus L. Ward, Detroit, Mich.

MINNESOTA STATE DENTAL ASSOCIATION, Minneapolis, Minn., June 9, 10, 1911.
Secretary, Dr. B. A. Sandy, Andrus Bldg., Minneapolis, Minn.

MISSISSIPPI DENTAL ASSOCIATION, Hattiesburg, Miss., May, 1911.
Secretary, Dr. L. B. Price, Corinth, Miss.

MISSOURI STATE DENTAL ASSOCIATION, Joplin, Mo., June 13, 14, 15, 1911.
Secretary, Dr. S. C. A. Rubey, Clinton, Mo.

MONTANA STATE DENTAL SOCIETY, Helena, Mont., June 2, 3, 1911.
Secretary, Dr. R. H. Severance, Great Falls, Mont.

NEBRASKA STATE DENTAL SOCIETY, Lincoln, Neb., May 16, 17, 18, 1911.
Secretary, Dr. J. H. Wallace, 212 Brown Block, Omaha, Neb.

NEW MEXICO DENTAL SOCIETY.
Secretary, Dr. L. E. Erwin, Carlsbad, New Mexico.

NEW HAMPSHIRE STATE DENTAL SOCIETY, Fabyan, N. H., June 27, 28, 29, 30, 1911.
Secretary, Dr. F. F. Fisher, 913 Elm St., Manchester, N. H.

NEW JERSEY STATE DENTAL SOCIETY, Asbury Park, N. J., July 19, 20, 21, 1911.
Secretary, Dr. Chas. A. Meeker, 29 Fulton St., Newark, N. J.

NEW YORK STATE DENTAL SOCIETY, Albany, N. Y., May 4, 5, 6, 1911.
Secretary, Dr. A. P. Burkhart, 52 Genesee St., Auburn, N. Y.

NORTH CAROLINA DENTAL SOCIETY, Morehead City, N. C., June 28-July 1, 1911.
President, Dr. A. H. Fleming, Louisburg, N. C.

NORTH DAKOTA STATE DENTAL SOCIETY, May 11, 1911.
Secretary, Dr. F. A. Bricker, Fargo, N. Dak.

OHIO STATE DENTAL SOCIETY.
Secretary, Dr. F. R. Chapman, Schultz Bldg., Columbus, Ohio.

OREGON STATE DENTAL ASSOCIATION, Portland, Ore., June 6, 7, 8, 1911.
Secretary, Dr. F. H. Walgamitt, Medical Bldg., Portland, Ore.

PENNSYLVANIA STATE DENTAL SOCIETY, Scranton, Pa., June 27, 28, 29, 1911.
Secretary, Dr. Luther M. Weaver, 7103 Woodland Ave., Philadelphia, Pa.

RHODE ISLAND DENTAL SOCIETY.
Secretary, Dr. C. A. Carr, 209 Spring St., Newport, R. I.

SOUTH CAROLINA DENTAL ASSOCIATION, Columbia, S. C.
Secretary, Dr. W. B. Simmons, Piedmont, S. C.

SOUTH DAKOTA STATE DENTAL SOCIETY, Aberdeen, S. D., May 16 and 17, 1911.
Secretary, Dr. M. R. Hopkins, Aberdeen, S. D.

TENNESSEE DENTAL ASSOCIATION, Nashville, Tenn., May 23, 24, 25, 1911.
Secretary, Dr. Walter G. Hutchinson, 151 8th Ave., North, Nashville, Tenn.

TEXAS STATE DENTAL ASS'N, San Antonio, Tex., May 11, 12, 13, 1911.
Secretary, Dr. J. G. Fife, 736 Wilson Blvd., Dallas, Tex.

UTAH STATE DENTAL SOCIETY.
Sec'y, Dr. W. G. Dalrymple, 2421 Washington Ave., Ogden, Utah

VERMONT STATE DENTAL SOCIETY, Fabyan, N. H., June 27, 28, 29, 30, 1911.
Secretary, Dr. H. F. Hamilton, Newport, Vt.

VIRGINIA STATE DENTAL ASSOCIATION, Richmond, Va., June 14, 15, 16, 1911.
Secretary, Dr. W. H. Pearson, Hampton, Va.

WASHINGTON STATE DENTAL SOCIETY, Tacoma, Wash., June 1, 2, 3, 1911.
Secretary, Dr. Burton E. Lemley, 930 C St., Tacoma, Wash.

WEST VIRGINIA STATE DENTAL SOCIETY.
Secretary, Dr. F. L. Wright, Wheeling, W. Va.

WISCONSIN STATE DENTAL SOCIETY, Eau Claire, Wis., July 11, 12, 13, 1911.
Secretary, Dr. O. G. Krause, Wells Bldg., Milwaukee, Wis.

New Jersey State Dental Society.

The forty-first annual meeting of the New Jersey State Dental Society will convene at Asbury Park, N. J., July 19, 20 and 21, 1911, beginning on Wednesday, July 19, at 10 A. M.

The Casino, with extensive floor alterations, has been secured for the exhibits and clinics. The exhibits will be the largest and most complete ever given by any State Society, and modern dental equipments and up-to-date instruments will be shown. Application should be made to

Dr. W. W. Hawke, of Flemington, N. J., Chairman of the Exhibit Committee, at an early date for space. The large and spacious Hotel Brunswick has been secured as headquarters for the society; it is situated near the Casino and the ocean. Rates are as follows: Two persons in one room, $3.50 per day; one person in room, $4 per day; rooms with bath, $1 extra.

On account of the noise from the ocean it is necessary to hold the business meeting and have the papers read in the large ballroom of the Brunswick. Clinics and exhibits in the Casino. Programs will be out the first part of July, and will be mailed upon request to ethical practitioners from other States contemplating a visit to the meeting.

CHARLES A. MEEKER, D.D.S., Secretary.

29 Fulton St., Newark, N. J.

Indiana State Dental Association.

The program for the fifty-third annual meeting of the Indiana State Dental Association, which meets May 16-18, is completed, and Dr. Kennedy, Chairman of the Executive Committee, says: "This meeting will be the brightest and snappiest ever held in the history of the association."

Dr. F. M. Bozer, Supervisor of Clinics, has arranged for a fine clinic. Many prominent men from Iowa, Illinois, Kentucky and Ohio will be on the program and give clinic.

We will have an increased number of exhibits, as more space has already been sold than ever before.

The meeting last year was good, this one will be better.

Huntington, Ind. OTTO U. KING, Secretary.

Alabama Dental Association—Change of Meeting.

In order that the dates of meeting of the Southern Branch of the National and Alabama Dental Associations may not fall so near together, the Alabama Dental Association will hold its next annual session in Montgomery, Alabama, commencing the first Tuesday in June instead of the second Tuesday in May, 1911.

All ethical dentists are invited to attend.

By order of the Executive Committee.

E. W. PATTON,
Secretary Alabama Dental Association.

Lake Erie Dental Association.

The forty-eighth annual meeting of the Lake Erie Dental Association will be held at the Vanadium (Rider) Hotel, Cambridge Springs, Pa., May 16, 17 and 18, 1911. A cordial invitation to attend is extended to all reputable practitioners.

J. F. BIDDLE, D.D.S., President, 517 Arch St., N. S., Pittsburgh, Pa.
C. A. BRENNAN, D.D.S., Vice-President, Sharon, Pa.
V. H. MCALPIN, D.D.S., Secretary, Warren, Pa.
D. C. DUNN, D.D.S., Treasurer, Meadville, Pa.

California State Dental Association.

The thirty-eighth annual meeting of the California State Dental Association will be held in San Francisco, June 14, 15, 16, 17, 1911, at the Palace Hotel. An invitation is extended to all our friends to meet with us.

C. E. POST, Secretary.
126 Stockton St., San Francisco, Cal.

Southern Wisconsin Dental Association.

The seventeenth annual meeting of the Southern Wisconsin Dental Association will be held at Madison, Wis., Thursday and Friday, June 1st and 2d, 1911. A cordial invitation is extended to the profession to attend.

C. W. COLLVER, Secretary.
Clinton, Wis.

Pennsylvania State Dental Society.

The forty-third annual meeting of the Pennsylvania State Dental Society will be held in Scranton, at the Hotel Casey, June 27, 28, 29, 1911.

LUTHER M. WEAVER, Secretary.
7103 Woodland Ave., Philadelphia, Pa.

The North Carolina Dental Society.

The North Carolina Dental Society will hold its thirty-seventh annual meeting at Morehead City, June 28 to July 1, 1911. All ethical dentists are cordially invited to attend.

ARTHUR HYNES FLEMING, President, Louisburg, N. C.
J. W. STANLY, Secretary, Wilmington, N. C.

Maine, New Hampshire and Vermont State Dental Societies.

The State Dental Societies of Maine, Vermont and New Hampshire will meet in joint convention at the Fabyan House, Fabyan, New Hampshire, June 27 to 30 inclusive, 1911. This meeting, to be held amid the beauty and grandeur of the White Mountains, promises to be a delightful one, providing a diversity of entertainment for the visitors, a large number of helpful clinics, and an unusual display of instructive exhibits.

HARRY F. HAMILTON, Secretary.

Newport, Vermont, Feb. 9, 1911.

Vermont Board of Dental Examiners.

A meeting of the Vermont Board of Dental Examiners, for the examination of candidates to practice dentistry, will be held at the State House, Montpelier, July 6, 7 and 8, 1911, commencing at 2 o'clock P. M. on the 6th.

Applications, together with the fee of $25, must be in the hands of the Secretary ten days prior to the meeting.

For further information, apply to

GEO. F. CHENEY, Secretary.

St. Johnsbury, Vt.

Wisconsin Board of Dental Examiners.

The semi-annual meeting of the Wisconsin State Board of Dental Examiners, for the examination of applicants for license to practice dentistry in Wisconsin, will be held in Milwaukee, at the Dental Department of the Marquette University, corner 9th and Wells Sts., beginning Monday, June 12, 1911, at 9 A. M.

All applications together with the fee of $25 must be in the hands of the Secretary fifteen days before the examination.

For application blanks and general information, address

G. C. MARLOW, Secretary.

Lancaster, Wisconsin.

Pennsylvania Board of Dental Examiners.

The next meeting of the Pennsylvania Board of Dental Examiners will be held on June 14, 15, 16 and 17, 1911, at the Musical Fund Hall, Philadelphia, and the Pittsburg Dental College, Pittsburg. For application blanks, address the Superintendent of Public Instruction, Harrisburg.

ALEXANDER H. REYNOLDS, Secretary.

4630 Chester Ave., Philadelphia.

ITEMS OF INTEREST

Institute of Dental Pedagogics.

At the annual meeting of the Institute of Dental Pedagogics, held in Washington, D. C., December 27, 28 and 29, 1910, the following officers were elected for the ensuing year:

President, Dr. Donald M. Gallie; Vice-President, Dr. H. E. Friesell; Secretary-Treasurer, Dr. Fred W. Gethro, 917 Marshall Field Bldg., Chicago, Ill.

The next meeting will be held in Chicago, and the time has been changed to one month later, the dates being January 24, 25 and 26, 1912.

FRED W. GETHRO, Secretary-Treasurer.

Michigan State Board of Dental Examiners.

The next regular meeting of the Michigan State Board of Dental Examiners will be held at the Dental College Building, at Ann Arbor, during the whole of the week of June 19th, beginning on Monday, at 8 A. M. All applications and fees should be in the hands of the secretary at least ten days before that date. For full information, address

A. W. HAIDLE, Secretary.

Negaunee, Mich.

North Carolina State Board of Dental Examiners.

The regular annual meeting of the North Carolina State Board of Dental Examiners will be held at Morehead City, N. C., beginning promptly at 9 o'clock on the morning of June 26, 1911.

For further information, address

DR. F. L. HUNT, Secretary.

Asheville, N. C.

Iowa State Board of Dental Examiners.

The Iowa State Board of Dental Examiners will hold a meeting for the examination of candidates for license to practice dentistry in Iowa, beginning at 9 A. M., June 5, 1911, at Iowa City. For blanks and other information write

DR. J. A. WEST, Secretary.

417 Utica Bldg., Des Moines, Iowa.

SOCIETY ANNOUNCEMENTS

Mississippi State Board of Dental Examiners.

The Mississippi State Board of Dental Examiners will meet in annual session in the State Capitol, Jackson, Miss., Tuesday, May 16, 1911, at 9 A. M.

Applicants for license to practice dentistry in this State will be examined on the usual branches pertaining to the practice, as well as a practical examination. They will be furnished with chairs, blow-pipes, vulcanizers, etc., for the practical part, and with paper, blanks, ink, pens, etc., for the other. They should provide themselves with operating instruments.

Fee for examination is $10.00.

For any further information, apply to

L. B. McLAURIN, D.D.S., Secretary, Natchez, Miss., or

A. B. KELLY, D.D.S., President, Yazoo City, Miss.

Susquehanna Dental Association of Pennsylvania.

The forty-eighth annual meeting of the Susquehanna Dental Association of Pennsylvania will be held at the Water Gap House, Delaware Water Gap, Pa., May 23, 24, 25, 1911.

The officers for this year are: President, Dr. V. Q. Jones, Bethlehem; vice-president, Dr. F. L. Davenport, Wilkes-Barre; recording secretary, Dr. E. J. Donnegan, Scranton; financial secretary, Dr. Geo. E. Knox, Scranton; treasurer, Dr. C. C. Walker, Williamsport. Executive Committee: Dr. W. C. Middaugh, Easton, Chairman; Dr. H. S. Seip, Allentown; Dr. C. A. Bachman, Emans; Dr. Walter Richards, Slatington.

EDMOND J. DONNEGAN, Recording Secretary.

Scranton, Pa.

New Jersey State Board of Registration and Examination in Dentistry.

The New Jersey State Board of Registration and Examination in Dentistry will hold its semi-annual examination in the Assembly Chamber of the State House, Trenton, N. J., June 26, 27, 28, 1911.

All applications must be in the hands of the secretary ten days prior to the examination.

For information address CHARLES A. MEEKER, D.D.S.

29 Fulton St., Newark, N. J.

Arkansas State Board of Dental Examiners.

Next meeting of the Arkansas State Board of Dental Examiners will be held June 5th and 6th, Pine Bluff, Ark.

All applicants are required to pass a theoretical examination, fee $15. Examination covers all branches taught in dental schools. No temporary license issued. No interchange with any State.

A. T. McMillin, Secretary-Treasurer.

406 State Bank Building, Little Rock, Ark.

Indiana State Board of Dental Examiners.

The next meeting of the Indiana State Board of Dental Examiners will be held in the State House at Indianapolis, beginning at 9 o'clock, Monday, June 12, 1911. All applicants for examination and registration in this State will be examined at this meeting. There will be no other meeting until January, 1912. No temporary permits are issued by this Board. For further information, address

F. R. Henshaw, D.D.S., Secretary.

507 Pythian Bldg., Indianapolis, Ind.

The Texas State Board of Dental Examiners.

The next meeting of the Texas State Board of Dental Examiners, for the purpose of examining applicants for a license to practice dentistry in the State of Texas, will be held in Dallas, Tex., beginning June 19, 1911, at 9 A. M.

For application blanks and any further information, address

J. M. Murphy, Secretary.

Temple, Tex.

South Dakota Board of Dental Examiners.

The South Dakota State Board of Dental Examiners will hold its next meeting at Sioux Falls, S. D., Tuesday, July 11, 1911, at 1.30 P. M., and continuing three days. All applications for examination, together with a fee of $25, must be in the hands of the Secretary by July 1st. Applicants who have not complied with the above will not be permitted to take the examination.

For further information, blanks, etc., address

Aris L. Revell, Secretary.

Lead, So. Dak.